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THE UNIVERSITY OF ALBERTA

LONG-TERM CARE BED UTILIZATION IN ALBERTA

by

Chantelle M. Wellock

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE

OF MASTER OF HEALTH SERVICES ADMINISTRATION

DEPARTMENT OF HEALTH SERVICES ADMINISTRATION

AND COMMUNITY MEDICINE

EDMONTON, ALBERTA

FALL, 1988

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FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled, Long-Term Care Bed Utilization in Alberta submitted by Chantelle M. Wellock in partial fulfillment of the requirements for the degree of Master of Health Services Administration.

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Date October 11, 1988

ABSTRACT

In light of the increasing elderly population, rising costs of long-term care and questions about the appropriateness of institutional care, the utilization of long-term care facilities by the elderly merits investigation. The objectives of this study were to predict possible changes in the elderly's utilization of long-term care beds; to identify mutable trends to reduce rates of institutionalization; to identify any inequities in the distribution of long-term care beds; and to monitor the effects of changes in Alberta's long-term care system. Two types of analyses were employed. The first consisted of a historical analysis of population trends and of acute care, auxiliary and rehabilitation hospital utilization data. Per capita and relative utilization rates were calculated and analyzed. Cross-sectional analyses of nursing homes and auxiliary hospital utilization were also performed. An overview of patient characteristics including age, sex, marital status and patient origin in terms of previous type of residence was presented. Factors contributing to regional differences in utilization rates and patient travel patterns were analyzed. Characteristics of patients from areas of high and low utilization areas were also studied.

The historical analysis revealed first that the elderly increased their per capita utilization of acute care hospitals from 1971 to 1986 and that elderly females increased their share of long-stay acute care patient days. Secondly, utilization of auxiliary and rehabilitation hospitals increased by 75 percent in terms of patient days from 1972 to 1986. This increase was concurrent with an increase in the per capita bed supply.

The cross-sectional analyses revealed several key trends. Rates of institutionalization in nursing homes for all age groups declined, particularly among the young elderly. Since 1976, the proportions of elderly and female patients in nursing homes has increased, as well as the proportion of nursing home patients admitted directly from acute care hospitals. Regions with a high percentage of elderly persons also had a large long-term care bed supply and high utilization rates. It appears that the primary factor in explaining variation in utilization rates of long-term care beds is bed supply. For nursing homes, rural location and long-stay acute care separation rate also explained some of the variation. Overall, 90 percent of auxiliary hospital and 84 percent of nursing home patients were receiving care in the facility nearest their home. Variations in travel patterns were partially attributed to geographic location, bed supply and facility characteristics. Characteristics of long-term care patients in high and low utilization areas, in urban and non-urban areas showed few systematic differences.

Four central conclusions were drawn from the study findings. First, the number of bed blockers in acute care hospitals has increased and is a serious problem in Alberta. Second, there is a shortage of long-term care beds. The increase in the availability of community-based care may have caused the decline in the rate of institutionalization of the young elderly. Finally, there was little evidence to suggest that the distribution of long-term care beds is inequitable.

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CHAPTER I

INTRODUCTION

1.1 Statement of the Problem

Canada is facing a geriatric crisis resulting from social and demographic changes, and advances in medicine which occurred in the twentieth century (Schwenger, 1975). These changes have increased the need and demand for long-term care. Perhaps the most significant change is the growth of the elderly population, both in absolute numbers and relative terms resulting primarily from an increase in life expectancy. The number of elderly has increased by 640 percent from 420,000 in 1921 to 2.7 million in 1986 (Dominion Bureau of Stastistics, 1968; Statistics Canada, 1987). This number is expected to increase by another 260 percent to 7.1 million by the year 2031 (Statistics Canada, 1985). While advances in medicine have increased the average person's life expectancy, they have also contributed to a higher prevalence of chronic disease (Verbrugge, 1984). Over 85 percent of the elderly population suffers from at least one chronic health problem (Canadian Medical Association, 1987). Social changes such as the changing role of women in society have also had a significant impact on the demand for long-term care by decreasing the amount of family support available (Treas, 1977). Others, such as the rise in the divorce rate could have an impact on demand in the future. While these trends are not unique to Canada, Canada reportly has one of the highest rates of institutionalization of the elderly in the Western world (Jackson, 1985). Recently, rising costs and questions about the appropriateness

of institutional care have resulted in alterations to the long-term care system. In Alberta, for example, the Coordinated Home Care Program was introduced province wide in 1978 (Alberta Coordinated Home Care Program, 1987). Two of its principle objectives are to meet appropriate medical and social needs in the home and to prevent, delay or reduce institutionalization. Another significant change occurred in Alberta's long-term care system in the distribution of beds within the province. In the last decade, the government of Alberta has built more long-term care beds in rural areas than in Edmonton and Calgary, as shown in Table 1. Alberta's long-term care system will likely continue to evolve in the future if the single point of entry model, which is currently being tested in southern Alberta, is introduced. It is imperative that trends in the utilization of institutional long-term care be studied periodically to determine the effects of these changes.

1.1 Study Objectives

The primary purpose of this thesis was to analyze historical and current utilization patterns of Alberta's institutional long-term care sector. The objectives of this study were 1) to predict possible changes in the elderly's utilization of long-term care beds; 2) to identify mutable trends to reduce rates of institutionalization, where appropriate; 3) to identify any inequities in the distribution of long-term care beds; and 4) to monitor the efects of changes in Alberta's long-term care system. The analysis will consist of five sections. First, utilization data from acute care hospitals, and auxiliary and rehabilitation hospitals will be studied historically from the early 1970's to present to analyze trends in length of stay,

Table 1

Nursing Home and Auxiliary Hospital Beds in Alberta, as at March 31, 1980 to 1987

Nursing Home Beds

Year	Total Number of Beds	Total Net Change	Edmonton Number of Beds	Edmonton Net Change	Calgary Number of Beds	Calgary Net Change	Other Number of Beds	Other Net Change
1980	7,132	+107	1,764	+100	2,173	0	3,195	+7
1981	7,255	+123	1,761	-3	2,113*	-60	3,381	+186
1982	7,286	+31	1,761	0	2,169	+56	3,356	-25
1983	7,340	+54	1,761	0	2,212	+43	3,372	+16
1984	7,590	+250	1,911	+150	2,282	+70	3,397	+25
1985	7,694	+104	1,911	0	2,282	0	3,501	+104
1986	7,808	+114	1,911	0	2,282	0	3,615	+114
1987	7,868	+60	1,911	0	2,282	0	3,675	+60
Total Change		+843		+247		+109		+487

Auxiliary Hospital Beds

Year	Total Number of Beds	Total Net Change	Edmonton Number of Beds	Edmonton Net Change	Calgary Number of Beds	Calgary Net Change	Other Number of Beds	Other Net Change
1980	3,668	+223	1,140	+165	1,276	0	1,252	+58
1981	3,903	+235	1,356	+216	1,280	+4	1,267	+15
1982	4,213	+310	1,566	+210	1,370	+90	1,277	+10
1983	4,399	+186	1,566	0	1,460	+90	1,373	+96
1984	4,519	+120	1,641	+75	1,460	0	1,418	+45
1985	4,740	+221	1,713	+72	1,444	-16	1,583	+165
1986	4,900	+160	1,713	0	1,444	0	1,743	+160
1987	5,013	+113	1,667	-46	1,444	0	1,902	+159
Total Change		+1,568		+692		+168		+708

*The Mayfair Nursing Home in Calgary was closed for fire renovations on September 27, 1980. As a result, temporary arrangements were made to accommodate patients vacated from the Mayfair in other long-term care facilities and acute care hospitals in Calgary. Changes in bed complements in 1980/81 and 1981/82 were due solely to the closing and reopening of the Mayfair.

Sources: Alberta Hospitals and Medical Care, Annual Reports, 1978/79 to 1986/87.

separations and patient days. The second section is an overview of cross-sectional data on auxiliary hospital and nursing home utilization. Third, the province of Alberta will be divided into Long-Term Care Areas (LTCAs) and factors influencing the utilization of long-term care beds in these areas will be analyzed. Fourth is a study of patient origin-destination patterns which will describe where patients come from and go to for institutional care. The final procedure will study patient characteristics associated with high and low rates of long-term care bed utilization.

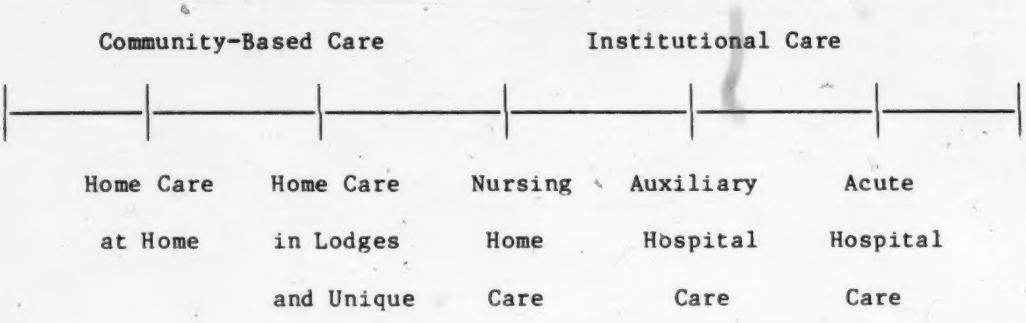
1.2 Significance of the Study

In the face of a continuous increase in the number of elderly in Alberta and of increasing costs for institutional care, it is important to monitor the utilization of instititutional care by the elderly to: 1) predict possible changes in utilization and 2) identify any mutable trends in utilization of institutional care in order to establish policies that could reduce utilization of that care. This thesis will attempt to identify these kinds of trends. The distribution of beds will also be analyzed to determine any inequities in the geographic distribution of beds exist.

There has not been a utilization study of Alberta's long-term care system since Raasok's study based on 1976 data and that study included only nursing homes. Since then, the Alberta Coordinated Home Care Program has become part of the long-term care system. One of its objectives is to prevent or delay institutionalization of the elderly (Alberta Coordinated Home Care Program, 1987). While this study is not designed to prove conclusively that home care has reached this

Figure 1

The Continuum of Care



objective, it is hoped that it may offer some preliminary evidence of home care's effects on utilization. The long-term care system must be thought of as a continuum of care, including persons receiving care in lodges or at home (through home care) at one end, and persons residing in long-term care facilities are the other end, as depicted in Figure 1. While acute care hospitals are not designed to accommodate long-term care patients, it is recognized in the literature that many patients who no longer require acute care are left in these facilities for extended periods. In the literature, most studies thus far have examined only one aspect of long-term care services, that is, home care, nursing home care or long-stay patients in acute care. This study will examine the utilization of long-term care options from the full range of institutional care available. Using data covering sixteen years, the study will also offer Alberta's first historical study of auxiliary hospital utilization and of long-stay patients in acute care hospitals.

1.3 Scope and Overall Limitations of the Study

Ideally, this study would use information on long-term care bed needs as well as supply to determine whether or not the distribution of beds is adequate to meet the needs of the province and is equitable among geographical regions. This type of information is not available and collection of such information through surveys is costly and beyond the scope of this project. Instead, utilization data are used. Therefore, understanding the relationship between need, utilization and demand will aid in developing a conceptual framework for the research strategy and data analysis and in drawing conclusions from the data. According to economic theory, demand is the number of persons who wish

to consume a product at a specified price while utilization is the actual consumption or purchase of that good (Scanlon, 1980). In a normal commodity market, utilization and demand tend to become equivalent: suppliers will adjust production and prices up in an attempt to maximize their profit until all persons desiring the product have purchased it. In the long-term care sector, however, the product (a long-term care bed) is virtually free to users and the process of price adjustment does not occur. As a result, demand will always be greater than supply, and utilization less than the demand. The concept of need involves a value judgement by the long-term care resident or potential resident and the assessor about the benefits of care offered and the person's ability to function without it (Scanlon, 1980). As such, need is difficult to measure. Thus demand is often used in place of need. Even demand is difficult to measure as information from waiting lists may not be accurate. Since there is no single agency which collects the data in Alberta, there may be persons on more than one list. Some nursing homes maintain a priority system. The first priority applicants require immediate placement while applicants on lower priority may be on the waiting list in the event of sudden illness or death of a spouse. Other nursing homes have only one waiting list. Lists may also contain people no longer needing placement.

This study will examine the utilization of acute care hospitals by long-stay patients, and auxiliary hospital and nursing home utilization. While it is recognized that the elderly are not the only users of long-term care facilities, the primary focus of this thesis will be on the geriatric population since they are the predominant users of long-term care facilities. This study will use administrative data

collected annually by Alberta Hospitals and Medical Care on the Professional Activity Study File and the Nursing Home Annual Returns File. These data are readily available and there is neither time nor financial resources to conduct a special survey. The data have proven to be useful in similar studies (e.g. Hasiuk, 1987; Raasok, 1979; Szafran, 1985). This limits the study of patient characteristics to a few basic demographic variables (age and sex) and patient origin.

1.4 Definition of Terms

The following defintions have been adopted for this paper.

The Elderly: Persons over the age of 65 years, in keeping with social and legislative practice.

Young Elderly: Persons aged 65 to 74.

Old Elderly: Persons aged 75 and over.

Nursing Homes: Facilities designated by government as nursing homes to provide personal care with supervision.

Auxiliary Hospitals: Facilities designated as auxiliary hospitals by government designed for patients who require a less intensive level of care than is provided in general hopitals.

Long-Term Care Facilities: Auxiliary and rehabilitation hospitals and nursing homes. Facilities such as lodges where some health care may be a part of the resident's daily routine are not considered to be long-term care facilities since health care is not provided by the facility.

Institutionalization: Denotes placement of a client in a long-term care facility.

Long-Term Care Services: The provision of organized services to persons of any age with a chronic disability over a prolonged period (Canadian Medical Association, 1987).

1.6 Format of Thesis

The thesis is presented in five chapters. The first chapter included a statement of the problem to be investigated, objectives of the research, significance of the study, study scope and limitations, and definition of terms. Chapter II is a selective review of literature relevant to the thesis. Chapter III outlines the research strategies used to analyze the data. Results are presented in Chapter IV and the final chapter contains conclusions and recommendations.

CHAPTER II

A SELECTIVE REVIEW OF THE LITERATURE

2.1 Introduction

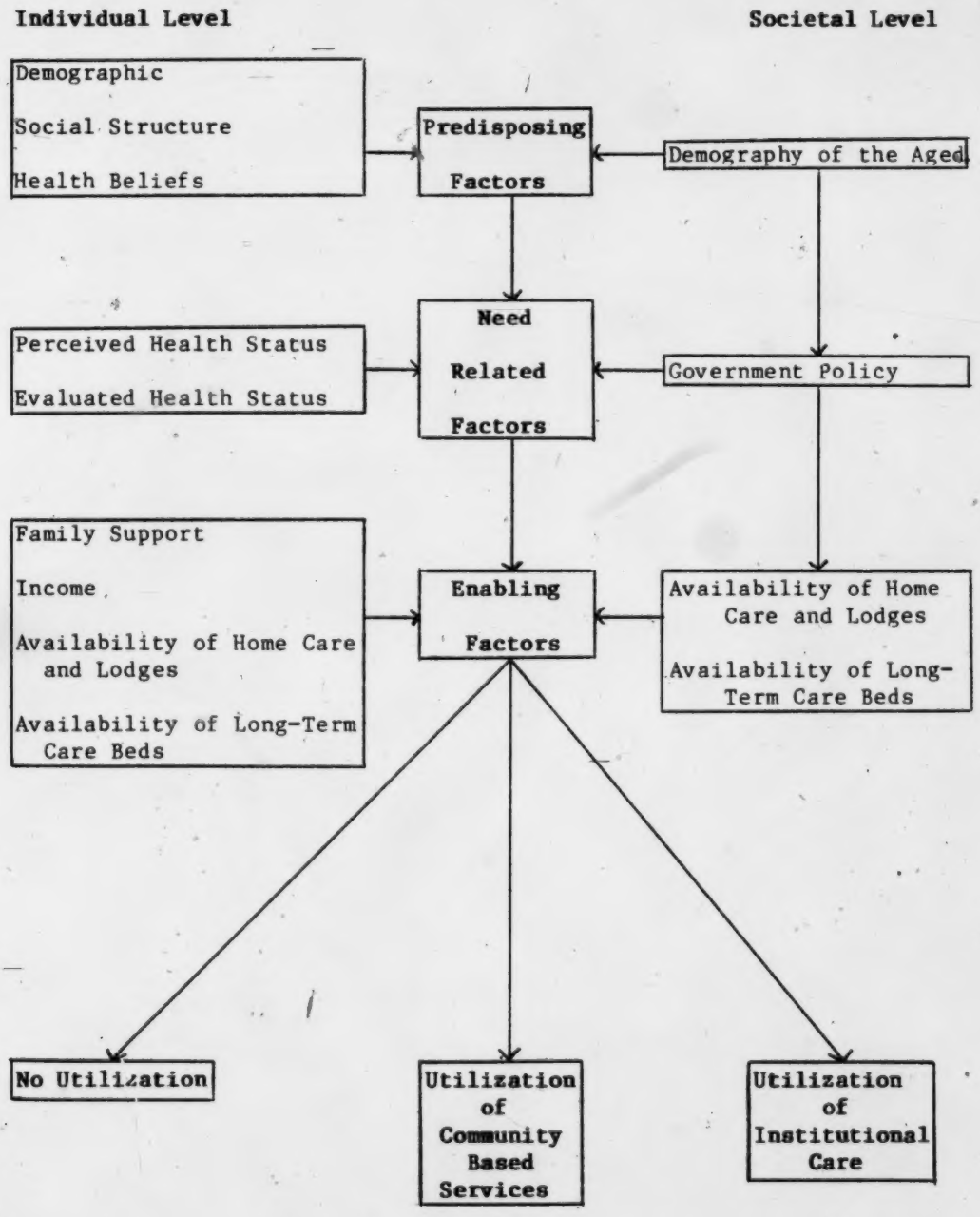
A conceptual model of long-term care service utilization is depicted in Figure 2. The model is based on one developed by Andersen in 1968, and modified by himself and his colleagues in 1975 (Andersen, Kravitz & Anderson, 1975). The model suggests three sets of sequential factors that lead to utilization. The factors operate on two levels: the individual and societal levels. At an individual level the factors influence which, if any, long-term care services a specified individual will utilize, while factors at a societal level determine the overall utilization of long-term care services. While the focus of this thesis is on long-term care bed utilization, it is necessary to show how institutional care fits into the broader spectrum of long-term care services available since the availability of these services undoubtedly influence the utilization of institutional care. Therefore, at the societal level, the discussion will focus on what kinds of long-term care services are available in Alberta. A discussion of current findings in the literature on the effects of factors influencing utilization follows an explanation of the model.

2.2 Model of Long-Term Care Service Utilization

Predisposing factors are those factors inherent in individuals that increase their propensity to utilize health services (Andersen, Kravitz & Anderson, 1975) or, in this case, long-term care services. These

Figure 2

Proposed Model of Long-Term Care Service Utilization



factors can be separated into three categories: demographic, social structure and health beliefs (Andersen, Kravitz & Anderson, 1975). On an individual level, demographic variables include age, sex and marital status while social structure variables identify the status of an individual in society as measured by characteristics such as ethnicity, income and education. These characteristics define the lifestyle and environmental risks that influence an individual's need for long-term care (Andersen, Kravitz & Anderson, 1975). At a societal level demographic trends such as the aging of the population and the rise in the divorce rate will influence the number of persons at risk of needing long-term care services (Andersen, Kravitz & Anderson, 1975). Health beliefs influence one's decision about the type of care acceptable to the individual or society as a whole (Andersen, Kravitz & Anderson, 1975).

If one has the appropriate combination of predisposing factors then one is likely to move forward along the path to institutionalization, that is, one may then have a NEED for long-term care bed (Andersen, Kravitz & Anderson, 1975). Need factors can be divided into two categories: (1) perceived need, based on a subjective health assessment, and (2) evaluated need, based on a clinical diagnosis or objective assessment by a physician (Andersen, Kravitz & Anderson, 1975).

Enabling factors are those which allow the individual to receive the care he/she needs (Andersen, Kravitz & Anderson, 1975). Enabling factors include both family and community resources such as income, presence of family members to care for the elderly person and availability of long-term care services. In the long-term care sector enabling factors operate at two different levels. If an individual's

needs indicate that he/she could cope at home with support then the availability of that support becomes an enabling factor; that is, the support ENABLES the individual to remain at home to receive the care needed. On the other hand, if an individual's needs indicate that institutional care is required and some factor prevents the person from receiving that care then this factor is also referred to as an ENABLING variable.

2.3 Individual Determinants of Utilization

2.3.1 Predisposing Factors

Results from most studies suggest that the rate of institutionalization increases with age (Branch & Jette, 1982; Cohen, Tell & Wallack, 1986; Shapiro & Webster, 1984; Vincente, Wiley & Carrington, 1979). For example, in Manitoba, about 2 to 3 persons per 1,000 aged 65 to 69 were admitted to nursing homes from 1974 to 1981 while about 60 persons per 1,000 age 90 and over were admitted over the same period (Shapiro & Webster, 1984). One study, however, found that age was not a clear predictor of institutionalization. In a 20 year longitudinal study, Palmore (1976) found no difference in the cumulative risk of institutionalization between persons who were older or younger at the beginning of the study. Palmore (1976) explains this paradox by suggesting that, as a person ages, his increased annual risk of institutionalization is balanced by his decreased remaining years before death. Other longitudinal studies such as Branch and Jette (1982), have not concurred with Palmore's findings.

Studies have generally found that nursing home utilization is higher among women than men (Greenberg & Ginn, 1979; Kraus, Spasoff,

Beattie, Holden, Lawson, Rodenberg & Woodcock, 1976a; Shapiro & Tate, 1985). This is because women have a greater life expectancy than men (Wingard, Jones & Kaplan, 1987). The question that remains is whether or not utilization of nursing homes is greater among women at any given age. Most studies have supported the idea that women are indeed institutionalized more often than men at any given age (Greenberg & Ginn, 1979; Kraus et al., 1976a; Palmore, 1976; Shapiro & Tate, 1985; Vincente, Wiley & Carrington, 1979). Branch and Jette (1982), however, found that being female was not associated with institutionalization.

Nursing home residents are typically not married (Greenberg & Ginn, 1979; Kraus et al., 1976a; Palmore, 1976; Shapiro & Tate, 1985; Vincente, Wiley & Carrington, 1979). This association remained strong even when other variables such as age, sex and functional status were considered (Greenberg & Ginn, 1979; Palmore, 1976; Shapiro & Tate, 1985). In summary, the demographic variables portray the typical nursing home resident as being an elderly unmarried woman.

Social structure variables (eg. race and education) have not been well-studied. A few reports in the United States have shown that non-white persons use nursing homes less often than white persons (e.g. Palmore, 1976; Vincente, Wiley & Carrington, 1979; Wershow, 1976).

The effects of health beliefs on long-term care bed utilization have also not been well-documented. Perhaps the best measurement of health beliefs in the literature is that of willingness to enter a nursing home, which assumes that one who believes in the efficacy of nursing home care would be more willing to enter a nursing home. Branch and Jette (1982) found that willingness to enter a nursing home did not help

to determine whether or not a person entered a nursing home. This result differs from an earlier study by Greenberg and Ginn (1979).

2.3.2 Need Related Factors

The impact of both perceived and evaluated physical and mental health status on utilization of long-term care beds has been well-documented. In a survey of applicants to long-term facilities and non-applicants Kraus and associates (1976a) found that the applicants were more likely to rate their health as poor (28% vs. 3%), and report having two or more chronic health problems (81% vs. 52%) than the non-applicants. More patients in nursing homes tend to be incontinent and have a moderate degree of confusion than those in lower level care facilities (Zimmer, 1975). Patients in nursing homes are more likely to require assistance with ambulation and feeding, and have difficulty in communicating than residents of lower level care facilities (Kane, Olsen, Thetford & Byrnes, 1976). In a longitudinal study of a cohort of persons aged 55 and over, Vincente, Wiley and Carrington (1979) found that although health status at the beginning of the study was not associated with whether or not a person had a single episode of institutionalization, it did affect the total number of days one spent in a long-term care institution.

In Alberta, physicians and Assessment and Placement Committees evaluate an individual's need for long-term care services and what type of services are best for the individual. Physicians in particular may not be aware of community based alternatives and thus recommend only institutional care (Berg, Browning, Hill & Wenkert, 1970; Spasoff, Kraus, Beattie, Holden, Lawson, Rodenburg & Woodcock, 1978). Physicians

have also been shown to be influential in the decision to enter a long-term care facility. A study in Kingston, Ontario showed that physicians were the first ones to suggest long-term care placement in 49 percent of cases studied over a one year period, and were the most important person involved in the decision in 23 percent of the cases (Kraus, Spasoff, Beattie, Holden, Lawson, Rodenberg & Woodcock, 1976b).

2.3.3 Enabling Factors

In determining whether one can receive care at home, the most important enabling factor is the availability of a support system to assist in caring for the person at home. The availability of caregivers has been measured in terms of having a surviving spouse, number of children nearby, minimal distance to relatives, frequency of contact with relatives and friends, and not living alone. Having a surviving spouse is most often studied and has provided the most consistent evidence that the availability of support at home reduces the risk of institutionalization (Greenberg & Ginn, 1979; Kraus et al., 1976b; Palmore, 1976; Shapiro & Tate, 1985; Vincente, Wiley & Carrington, 1979). Branch and Jette (1982), however, found no association between having a spouse and the risk of institutionalization but found that living with someone else reduces the risk of institutionalization. The second finding concurs with other studies (Palmore, 1976; Vincente, Wiley & Carrington, 1979). These findings explain why long-term care residents are typically elderly unmarried women. These women no longer have someone to look after them since women tend to marry older men and women have a longer lifespan.

In both Canadian and American studies high income has also been demonstrated to prevent premature institutionalization (Kraus et al., 1976a; Vincente, Wiley & Carrington, 1981). Researchers have suggested that these elderly are able to afford to purchase services that enable them to stay at home.

Few studies have investigated variables that determine whether or not one enters a nursing home once need for institutional care has been established. In a study of welfare recipients in the United States, nursing home bed supply was found to increase the risk of institutionalization only for those persons marginally at risk of being institutionalized (McCoy and Edwards, 1981). The term "marginally at risk" was defined as having a moderate ability to look after oneself. Raasok (1979) found that areas with higher bed/population ratios also had higher utilization rates and that patients in these areas tended to be younger than those in areas with low bed/population ratios.

Patients' choice of care destination can influence whether or not a patient accepts a placement when offered. Characteristics of long-term care facilities such as physical amenities, care programs, ethnic or religious affiliation or location may affect that choice. Kraus and associates (1976b), in their study of applicants to long-term care facilities, found the following features to be most appealing to applicants: good care, services, program, or staff; good physical facilities, layout or cleanliness; friendly environment or contentment of residents; and location. One might expect to find that larger facilities might be preferred by potential residents since they ostensibly could offer more services due to greater economies of scale. Raasok (1979), however, found that size of facility had a weak and

possibly spurious influence on utilization patterns while religious affiliation and location had much stronger influences on utilization patterns; specifically, nursing homes in urban areas or with a religious affiliation tended to have more non-local utilization.

2.3.4 Summary

The literature has revealed a myriad of individual determinants of utilization of long-term care facilities and services. The focus of much of the literature has been to characterize long-term care residents in terms of demographic and health related factors. Thus far little information exists on how factors such as bed supply and facility characteristics affect utilization. Noticeable by its absence is longitudinal information on demographic characteristics of patients and other factors affecting utilization. As stated by Raasok (1979) these determinants are continuously undergoing change, as will be shown in the next section which deals with societal determinants of utilization.

2.4 Societal Determinants of Utilization

2.4.1 Predisposing Factors: The Demography of the Aged

The demography of the aged will have a significant impact on the demand for long-term care in the next century. While the elderly population has increased dramatically in the twentieth century both in relative and absolute terms, this growth is expected to be even more dramatic in the early twenty-first century (Table 4). In 1986 the elderly numbered over 2.7 million in Canada, up 640 percent from 420,000 in 1921 (Dominion Bureau of Statistics, 1968; Statistics Canada, 1987). It is forecasted that, by the year 2031, there will be 7.2 million

Table 2

Canadian Population, 1921 to 2031

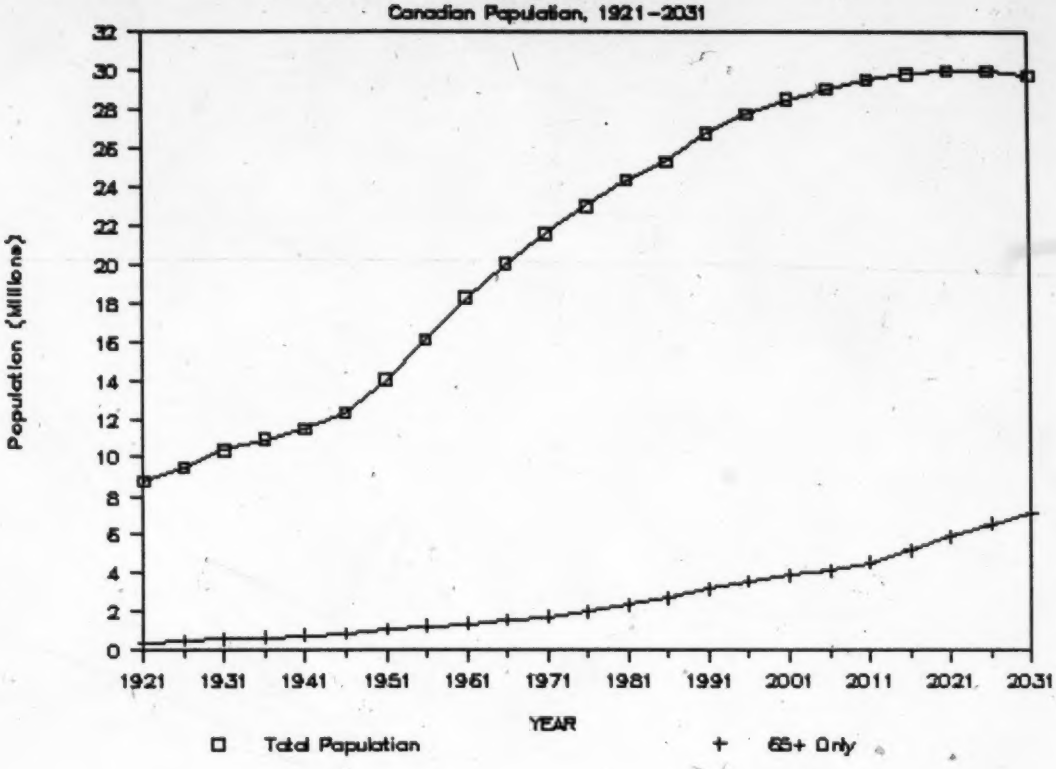
YEAR	(Thousands) 0-14			15-64			65+			Total			Percentage 65+			Dependency Ratio*			Sex Ratio**	
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	Total	65+
1921	1525	1497	3023	2159	2023	4182	215	205	420	4530	4258	8788	4.7	4.8	4.8	0.10	0.10	0.10	94	95
1926	1582	1563	3146	2323	2250	4573	248	239	487	4814	4637	9451	5.2	5.1	5.2	0.11	0.11	0.11	96	96
1931	1659	1622	3281	2714	2470	5184	295	282	576	5375	5002	10377	5.5	5.6	5.6	0.11	0.11	0.11	93	96
1936	1641	1604	3246	2952	2716	5669	341	328	669	5645	5305	10950	6.0	6.2	6.1	0.12	0.12	0.12	94	96
1941	1619	1579	3198	3145	2959	6104	391	377	768	5901	5606	11507	6.6	6.7	6.7	0.12	0.13	0.13	95	96
1946	1739	1681	3420	3261	3151	6411	448	431	879	6261	6031	12292	7.2	7.1	7.2	0.14	0.14	0.14	96	96
1951	2168	2082	4250	3420	3385	6805	551	535	1086	7089	6921	14009	7.8	7.7	7.8	0.16	0.16	0.16	98	97
1956	2663	2561	5225	3787	3684	7472	622	622	1244	8152	7929	16081	7.6	7.8	7.7	0.16	0.17	0.17	97	100
1961	3166	3025	6191	4188	4078	8265	674	717	1391	9219	9019	18238	7.3	7.9	7.6	0.16	0.18	0.17	98	106
1966	3372	3218	6591	4690	4650	9340	717	823	1540	10054	9961	20015	7.1	8.3	7.7	0.15	0.18	0.16	99	115
1971	3263	3117	6380	5464	5452	10917	782	963	1744	10795	10773	21568	7.2	8.9	8.1	0.14	0.18	0.16	100	123
1976	3020	2876	5896	6239	6258	12497	875	1127	2002	11450	11543	22993	7.6	9.8	8.7	0.14	0.18	0.16	101	129
1981	2811	2669	5481	6749	6784	13533	1011	1350	2361	12068	12275	24343	8.4	11.0	9.7	0.15	0.20	0.17	102	134
1986	2764	2627	5391	6766	6813	13579	1133	1564	2698	12486	12824	25309	9.1	12.2	10.7	0.17	0.23	0.20	103	138
1991	2844	2704	5548	6955	6888	13844	1342	1831	3173	13236	13545	26781	10.1	13.5	11.8	0.19	0.27	0.23	102	136
1996	2837	2695	5532	7088	7009	14097	1528	2050	3578	13717	14054	27772	11.1	14.6	12.9	0.22	0.29	0.25	102	134
2001	2729	2591	5320	7297	7267	14563	1671	2214	3885	14083	14446	28529	11.9	15.3	13.6	0.23	0.30	0.27	103	133
2006	2582	2451	5033	7754	7766	15520	1787	2355	4141	14348	14739	29088	12.5	16.0	14.2	0.23	0.30	0.27	103	132
2011	2494	2367	4862	8094	8116	16211	1970	2572	4541	14539	14973	29512	13.5	17.2	15.4	0.24	0.32	0.28	103	131
2016	2476	2350	4826	8033	8012	16045	2267	2927	5195	14700	15152	29852	15.4	19.3	17.4	0.28	0.37	0.32	103	129
2021	2467	2341	4809	7770	7704	15474	2563	3307	5871	14766	15259	30026	17.4	21.7	19.6	0.33	0.43	0.38	103	129
2026	2418	2295	4713	7428	7319	14747	2872	3712	6584	14729	15276	30004	19.5	24.3	21.9	0.39	0.51	0.45	104	129
2031	2336	2217	4553	7171	7050	14221	3109	4020	7128	14584	15194	29779	21.3	26.5	23.9	0.43	0.57	0.50	104	129

*Dependency Ratio: Number of Persons Aged 65+/Number of Persons Aged 15 to 64
**Sex Ratio: Number of Females per 100 Males

elderly persons, up 260 percent from 1986 (Statistics Canada, 1985). More significant than the actual number of the elderly is their relative portion of the population. In 1921, the elderly made up 4.8 percent of the population; this more than doubled by 1986 to 10.7 percent and will approximately double again by 2031 to between 19 and 27 percent. Figure 3 shows that while the number of elderly persons is expected to increase over the next 45 years the population aged 0 to 64 is expected to increase only to the year 2000 then is expected to decline. This is a result of declining fertility rates (Statistics Canada, 1985). These trends have a significant impact on the dependency ratio of the elderly to the working population. Table 2 shows that the dependency ratio has doubled from 0.10 in 1921 to 0.20 in 1986. By 2031, it will increase to 0.50; in other words, the members of the working population will be expected to support more than twice as many elderly persons as it does now. An important demographic trend yet to be explored in the literature is the rise in the divorce rate in the twentieth century. Numerous studies have reported that unmarried persons are more likely to be institutionalized than married persons (e.g. Liu & Manton, 1983a; Zimmer, 1975). Therefore the rise in unmarried persons will likely increase the demand for long-term care beds in the future.

As discussed earlier, the availability of a social support system is essential to allow an elderly person to receive care at home rather than being institutionalized. Informal care is usually provided by a spouse or other relative. Most often this other relative is a daughter (Treas, 1977). Decreasing fertility rates and increasing mobility of the population have reduced the number of available descendents to whom an older person may turn for assistance (Treas, 1977). The changing

Figure 3


Canadian Population, 1921-2031
Population (Millions)
32
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
1921
1931
1941
1951
1961
1971
1981
1991
2001
2011
2021
2031
YEAR
Total Population
65+ Only

role of women in society from homemakers to breadwinners has resulted in fewer women with time to care for elderly relatives (Treas, 1977). Should these trends continue, there will be even less informal care available in the future, resulting in an increase in demand for formal care.

2.4.2 Need Related Factors

At a societal level there are a number of need related factors that influence the utilization of long-term care services. First, the prevalence of chronic disease will determine the number of individuals at risk of requiring any type of long-term care. Whether or not the prevalence of chronic disease will increase or decrease has been the centre of much debate in the 1980s. Fries (1980 & 1983) speculated that the human lifespan is genetically predetermined at about 85 years. According to Fries, life expectancy has increased in the twentieth century because of an elimination of many types of premature deaths, particularly neonatal mortality. Lifespan, however, is fixed due to the progressive decline in the functional capacity of all human organs and cells. Fries suggests that life could end without the presence of disease other than "senescence", or old age. He then states the chronic diseases are now the major causes of premature death. Fries proposes that chronic diseases can be postponed with healthy lifestyles and suggests that this is already starting to happen. Thus, with a fixed lifespan and compressed morbidity Fries concludes that the prevalence of chronic disease would decrease. Morbidity data, however, does not support this conclusion. In a comprehensive analysis of morbidity data from the National Health Interview Survey, 1957 to 1981, Verbrugge

(1984) concludes that the prevalence of morbidity especially for chronic diseases is increasing at present. It is possible, however, that in the future, as incidence rates of chronic diseases fall and better treatment for these diseases becomes available, their prevalence could decline (Verbrugge, 1984).

Society defines the overall need for long-term care beds through government policy which dictates the number of beds that are to be built and operated. However he who pays the piper does not always call the tune, as was demonstrated by Shapiro and Webster (1984) in their study of nursing home utilization in Manitoba. In 1973 the Government of Manitoba insured nursing home stays. In the following year, the government started a provincial home care program. One purpose of this program was to reduce nursing home utilization. The Ministry of Health began attempting to persuade facilities providing the lowest level of care (Level I) and other levels to admit fewer persons requiring minimal care and to expand their admissions of persons requiring higher levels of care (Levels II, III, and IV). Shapiro and Webster (1984) found that the proportion of Level I patients admitted remained constant from 1974 to 1980. Instead the proportion of Level II patients decreased and Levels III and IV increased. As discussed in Shapiro and Webster (1984), this "illustrates the difficulty governments can encounter in trying to change the pattern of health care delivered by autonomous facilities that can select whom they will admit even when they are almost totally dependent on public funding"(p. 614).

2.4.3 Enabling Factors

Alberta's Institutional Care System

Society, through government policy, determines the types and amount of long-term care services available. In Alberta, institutional long-term care consists of 5,013 auxiliary care beds and 7,808 nursing home beds (Alberta Hospitals and Medical Care, 1988). In addition, there are psychogeriatric beds in the Youville Centre and 1,072 beds in two psychiatric hospitals, many of which are long-term care beds. There are also lower level care beds in the Michener Centre (a facility for mentally handicapped persons) and 550 beds in Rosehaven, Raymond and Claresholm Extended Care Centres. Together, elderly persons reside in about 12,000 beds in the above facilities, as shown in Table 3.

Alternatives to Institutional Care: The Care Component

The provincial Coordinated Home Care (CHC) Program was initiated in 1978 and expanded in 1984. The CHC Program provides nursing, personal care and homemaking services to elderly and/or handicapped persons upon a physician's referral. The cost of providing care at home may not exceed the cost of providing a similar level of care in an institution. The program is funded by Alberta Community and Occupational Health and through user fees. At the end of the 1986 fiscal year, CHC had a caseload of more than 12,000 clients, as shown in Table 4. In addition to the home care program, there are day care and day hospital programs operating in Calgary and Edmonton (Committee on Long Term Care for Senior Citizens, 1988).

Table 3

Estimated Number of Persons Aged 65+ in Residential and Care Facilities in Alberta, 1985/86

Type of Facility	Number of Elderly Residents
Nursing Homes (93 percent 65+)	7,268
Auxiliary Hospitals (80 percent 65+)	3,871
Extended Care Centres (72 percent 65+)	397
Michener Centre (12 percent 65+)	153
Alberta Hospitals, Edmonton and Ponoka (39 percent 65+)	379
SUBTOTAL CARE CENTRES	12,068
Lodges (88 percent occupancy)	5,943
Unique Homes	380
TOTAL RESIDENTIAL AND CARE CENTRES	18,391

Source: Senior Citizen's Bureau, 1987.

Table 4

Costs and Length of Stay Statistics, Alberta Coordinated Home Care Program, Services Ending March 31, 1986

Days on Program	Number of Clients (current)	% of Clients	Cost Per Client	Cost Per Day	Average Length of Stay (Days)
1-10	172	1.40	$ 33.87	$5.52	6.0
11-30	531	4.33	78.98	3.85	21.0
31-60	716	5.84	141.47	3.10	46.0
61-120	993	8.09	238.98	2.67	89.0
121-240	1,614	13.16	449.68	2.55	176.0
241-365	1,555	12.68	877.89	2.95	298.0
365+	6,687	54.51	2,446.48	2.61	938.0
All Groups	12,268	100.00	$1,535.44	$2.63	583.0

Source: Alberta Coordinated Home Care Program, 1987.

Alternatives to Institutional Care: The Housing Component

Across the province there are 6,753 lodge beds and 308 places in unique homes, which are under the auspices of Alberta Mortgage and Housing Corporation (Senior Citizens Bureau, 1987). Lodges and unique homes are not considered to be long-term care facilities but they provide alternative housing for elderly persons who require domiciliary care. Personal care and other services provided through the Home Care Program have enabled a growing number of lodge residents to remain in lodges (Alberta Mortgage and Housing Corporation, 1987).

2.4.4 Summary

The demography of the aged will obviously have a significant impact on the need for long-term care services. Population projections indicate a dramatic increase in the number of elderly persons in the future. Trends in the prevalence of chronic disease are more difficult to predict. The composition of the long-term care sector determines who receives what kind of care. Alberta's long-term care system is composed of several types of facilities and community-based services.

Few studies have attempted to document the effects of long-term care bed and/or service supply on the utilization of long-term care beds, except to the extent that they affect inappropriate utilization, which is discussed in the following section.

2.5 Selected Aspects of the Utilization of Long-Term Care Beds

2.5.1 Rates of Institutionalization

Kastenbaum and Candy (1973) first characterized the observation that 4 to 5 percent of the elderly population live in long-term care institutions as the "four percent fallacy". In their review of obituaries and death certificates from metropolitan Detroit, they found that 20 percent of those elderly who died in 1971 were listed as residents of long-term care facilities yet only four percent of the elderly population was reported to be living in long-term care facilities. This finding has been replicated by Lesnoff-Caravaglia (1978-79), Palmore (1976), and Vincente, Wiley and Carrington (1979). However, as Wingard, Jones and Kaplan (1987) commented, the four percent fallacy is not really a fallacy at all. The four percent figure refers to patients who live in nursing homes at any one time while the 20 percent figure is an estimate of a person's lifetime risk of being institutionalized. Estimates of lifetime risk have ranged from 20 percent (Kastenbaum & Candy, 1973) to 39 percent (Vincente, Wiley and Carrington, 1979) to 43 percent (Cohen, Tell & Wallack, 1986) depending on the definition of long-term care facility and study design.

2.5.2 Patterns of Utilization

The utilization literature changed focus in the 1980's as researchers examined residents more closely and realized that they were not a homogeneous group. There was an early study by Falk (1971) but it was virtually ignored in the 1970's as research efforts concentrated on establishing lifetime risk. Falk (1971) described two distinct patient

populations: those who were residents and stayed for many years or until death, and those who were admitted for specific ailments and stayed for relatively shorter periods of several months to several years. Researchers in the eighties found similar patterns and have begun to characterize the two populations. Three significant studies of length of stay patterns, all from the United States, will be discussed here. The first is a longitudinal study of one county while the second and third use national data from one year. Vincente, Wiley and Carrington (1981) studied utilization patterns of a cohort of elderly persons in California from 1965 to 1975. Their study revealed that the majority of persons with nursing home stays (61 percent) spent less than six months in nursing homes but a sizable minority (29 percent) had accumulated more than 365 days.

In the second study, Keeler, Kane and Solomon (1981) used data from two National Nursing Home Surveys (NNHS) in 1973 and 1977. The third study resulted in a series of articles by Liu and various associates using the 1977 National Nursing Home Survey. The two research teams used different methodologies in analysing the data. Keeler, Kane and Solomon derived an admission cohort from the discharge data while Liu and Palesch derived a 1976 user group from discharge data in 1976 and the survey of current residents in 1977. From this, the research teams described two types of patients: short-stay patients and long-stay patients. The proportion of short-stay patients that were male and/or married was greater than those in the long-stay population (Keeler, Kane & Solomon, 1981; Liu & Palesch, 1981). Keeler, Kane and Solomon (1981) found that short stay patients were also more likely to be younger than long-stay patients, while Liu and Palesch (1981) found that both patient

populations had the same age distribution. In a more detailed analysis of the 1977 NNHS, Liu and Manton (1984) found that patients over the age of 85 had slightly different length of stay patterns: a smaller proportion had a length of stay less than one month and a larger proportion had a length of stay greater than six months. Diagnoses of these two patient populations were also studied. Short-stay patients generally had diagnoses of cancer and bone fractures while long-stay patients were more likely to be mentally ill, have had a stroke or were suffering from chronic brain syndrome (Keeler, Kane & Solomon, 1981, Liu & Manton, 1984). Manton, Liu and Cornelius (1985) found that short-stay patients were more likely to be covered by Medicare or private insurance than long-stay patients since Medicare and most private insurance companies cover only the first 100 days of nursing home care.

2.5.3 Geographic Perspectives in Long-Term Care Bed Utilization

To date there have been few studies which examine geographic perspectives in long-term care bed utilization. A study by Davis and Gibbin (1971) of nursing home use and misuse in Western New York found that persons from an urban area were more likely to be inappropriately placed in nursing homes than persons from rural areas. Furthermore, persons from rural areas requiring nursing home care but not in nursing homes were more likely to remain at home whereas those from urban areas tended to be in general hospitals while awaiting nursing home placement. Davis and Gibbin (1971) suggested that these observations may have been due to elderly persons in urban areas having a reduced number of human resources available to them than the rural elderly. However, this explanation does not take into account the emigration of younger persons

from rural areas which would increase the social isolation of the elderly remaining in rural communities, nor does it account for the relative paucity of support services for the elderly that exists in rural areas (Greene, 1984). Evidence from a study by Greene (1984) in Arizona refutes Davis and Gibbin's (1971) conclusions. Patients from rural areas in nursing homes were less impaired in terms of requiring assistance in Activities of Daily Living, alertness and judgement than patients from urban areas (Greene, 1984). The proportion of nursing home patients who were married or female was the same among both rural and urban nursing homes but rural patients, on average, were younger than urban patients (75.7 years versus 79.0 years). Rural patients also had been in nursing homes longer (2.9 years versus 2.0 years), and, as hypothesized by Greene, rural patients were more likely to have lived alone before being institutionalized (21 versus 13 percent). Greene concluded that the rural elderly were institutionalized prematurely.

A study of nursing home utilization in Alberta by Raasok (1979) may explain the above contradictory findings. Raasok found that utilization rates depended on bed supply: residents of rural areas with low bed supply had low utilization rates and those from areas (both urban and rural) with a higher bed supply had higher utilization rates. Bed supply was not examined in either Davis and Gibbin (1971) or Greene (1984). Perhaps in rural western New York, the bed supply in rural areas was greater than in urban areas and vice versa in Arizona.

2.5.4 Inappropriate Utilization

The concept of inappropriate utilization encompasses three dimensions: unnecessary utilization (overuse); receiving an

inappropriate level of care (misuse); and requiring long-term care but not receiving it (nonuse) (Raasok, 1979). While the literature is replete with suggested reasons for inappropriate utilization, studies attempting to establish causation are virtually non-existant. Some of the most common suggested reasons are: a lack of appropriate beds, lack of community-based services, lack of well-developed assessment and placement procedures, facilities rejecting certain patients and patients not accepting placement (Berg et al., 1970; Davis & Gibbin, 1971; Dunlop, 1976; Greene, 1984; Kraus et al., 1976b; Spasoff et al., 1978).

The majority of research thus far has focussed on overuse and misuse of institutional care. One exception is a study by Davis and Gibbin (1971) which examined factors related to nonuse as well as misuse and overuse. They found that among persons requiring nursing home care, those aged 65 to 74, male, or married were less likely to receive such care.

Estimates of overuse range from 15 to 30 percent of the nursing home population (Berg et al., 1970; Cape, Shorrock, Tree, Pablo, Campbell & Seymour, 1977; Davis & Gibbin, 1971; Kraus et al., 1976b; Spasoff et al., 1978).

2.5.5 Long-Stay Patients in Acute Care Hospitals

Long-stay patients in acute care hospitals are often referred to as "bed blockers" since they utilize beds that may be required for other patients with acute illnesses. Bed blocking is considered to be a common problem yet the term "bed blocker" has no conventional definition (Hall & Bytheway, 1982). The definition used depends on the perspective of the person using the term. Hasiuk (1987, p. 43) summarizes many of

these with her definition of bed blockers as being "geriatric patients [in acute care hospitals] who have recovered from the acute stage of illness but are not promptly discharged, render[ing] these beds unavailable for another admission." This hospital-oriented definition expresses the problem as a mis-allocation of hospital resources. Patients, mostly elderly, are kept in acute care beds because there is no long-term care bed to discharge the patient to, or support services required to discharge the patient home are not available, or perhaps no discharge planning has been done for the patient (Murphy, 1977). Shapiro and Roos (1981) refer to bed blockers as holdover patients and describe them as victims of the situation. They suggest a number of human costs involved: negative attitudes of hospital staff towards these patients result in further damage to their already fragile self-esteem; loneliness and isolation as relatives, pressed by staff to remove the patient from the hospital, cease to visit; mental deterioration and additional medical complications occur when these "unwanted" patients remain in hospital; and a trend towards discouraging emergency admissions of the elderly for fear that they may subsequently be difficult to discharge. A variety of solutions have been proposed to ameliorate this situation. These include opening up more geriatric beds in acute care, improving discharge planning, improving coordination between acute and long-term care institutions, expanding home care programs, and reallocating existing acute beds to long-term care beds (McArdle, Wylie & Alexander, 1975; Murphy, 1977; Shapiro, Roos & Kavanagh, 1980).

Several of these proposed solutions were implemented in Manitoba in the early 1970's (Shapiro, Roos & Kavanagh, 1980). Nursing home and

rehabilitation beds were built. The home care program was expanded. Both nursing home care and home care services were insured by government, based on assessed need. However, in 1976, the problem of acute care bed blockers had not dissipated, as demonstrated by Shapiro, Roos and Kavanagh (1980). They found that the average length of stay in acute care for elderly patients had increased in the period from 1972 to 1976 while the case mix had remained stable. The authors therefore disputed conclusions that bed blocking was due to a shortage of alternative programs and long-term care beds and supported the hypothesis that lack of coordination between acute and long-term care facilities, coupled with inadequate discharge plannning, causes bed blocking.

In an American study by Markson, Steel and Kane (1983) similar findings were reported. In the United States patients in acute care hospitals are said to use Administratively Necessary Days (ANDs) when they no longer require acute care but remain in hospital. The researchers studied the relationship between hospital characteristics, patient destination after acute care, and ANDs. The number of ANDs was found to be associated with high hospital occupancy, the proportion of patients for whom long-term care was arranged and types of long-term care arranged. Using a multiple regression model, the only independent variable which remained significant with the dependent variable ANDs was the proportion of patients placed in long-term care. These findings demonstrate that problems with placing patients in long-term care facilities contribute to bed blocking. The most revealing finding is the variation in ANDs between hospitals in spite of all hospitals being located in the same district of Massachusetts. The authors conclude

that "there may be certain hospitals that view long-term institutional care placement as the most appropriate solution for elderly patients who have been hospitalized rather than exploring other community-based alternatives" (Markson, Steel and Kane, 1983, p. 490).

While not limited to older patients, bed blocking is always associated with the elderly (Hall & Bytheway, 1982). Two British studies have attempted to characterize bed blockers. The studies revealed that they are typically elderly, female and lived alone before entering the hospital (McArdle, Wylie & Alexander, 1975; Murphy, 1977).

In summary, researchers and administrators agree that bed blocking is a mis-allocation of expensive technology resulting in a disservice to patients who are misplaced.

2.5.6 Summary

While approximately 5 percent of elderly persons are in long-term care facilities at a given time, elderly persons on average face a 15 to 30 percent chance of being admitted to such a facility. Residents of long-term care facilities are not a homogeneous group. There appears to be two types of patients. Short term patients are more often young men suffering from bone fractures or cancer. Long term patients are generally elderly unmarried women, often suffering from dementia or stroke.

Relatively few studies examining geographic perspectives of long-term care bed utilization exist. Evidence from these studies is contradictory and inconclusive. Further study is required.

Inappropriate utilization of both acute and long-term care facilities point to a lack of coordination between the two systems and a

shortage of appropriate beds and services. However, few studies have attempted to show an association between inappropriate utilization and these apparent causes. Missing from the literature are studies comparing regional variations in inappropriate utilization.

A methodology that has been overlooked in the study of long-term care utilization (with one exception) is that used in patient origin destination studies. The methodology and its applications are discussed in the following section.

2.6 Utilization Studies: Methodologies

2.6.1 Patient Origin-Destination Studies

In the last quarter century health care researchers and planners have utilized patient origin-destination studies anticipating that these types of studies would provide information on utilization patterns essential to health care program and facility planning. These studies have three purposes: 1) to analyze patient origin-destination patterns as patients utilize health care services; 2) to identify service areas and populations; and 3) to facilitate regional analyses of health care utilization and resource availability.

The framework for patient origin-destination methodologies was established by Ciocco and Altenderfer (1945) who analyzed birth statistics to describe patterns of dependency of some counties upon the medical facilities of other counties. Two ratios were used to quantify the patterns of patient movement from the county of patient origin to the county of health care facility destination. The first ratio, termed the in-residence birth ratio (IR), was calculated by dividing the number of births to residents which occurred within the county of origin by the

total births occurring to residents. The second ratio was termed the specific out-residence birth ratio (OR), calculated by dividing the number of births to residents which occurred in a specific area outside the county by the total births occurring to residents. The IR ratio served to measure the extent to which residents used obstetrical services within their own county while OR ratio measured the degree to which residents relied on other counties for obstetrical services. The researchers found that IR increased with increasing per capita hospital bed supply, and with decreasing income level of county residents. A number of counties (114) served as referral centres for a larger number of counties (406) while the other counties (101) remained independent.

Since Ciocco and Altenderfer (1945) a number of other researchers have investigated patterns of health care utilization by means of patient origin-destination analysis. In a patient origin study by Sharp and McCarthy (1971), using hospital discharge data from predominately rural areas in three northwestern states, the authors found that hospitals tended to provide services to the residents of their own county approximately 98 percent of the time. Distance had a significant impact on which hospital a patient used. Patients primarily used the closest hospital to them except when they required specialized care. This process of natural "regionalization" of specialty services was observed in Alberta for the general population (Toll, 1982) and the pediatric population (Romeril, 1984).

In a study of the effects of patient and hospital characteristics on patient origin-destination patterns Studnicki (1975) found that these character stics could be traced to affect utilization of hospitals. A large proportion (20 percent) of obstetrical patients travelled to

hospitals farthest from their residence. A step-wise regression analysis identified a number of hospital characteristics (e.g. occupancy rate, proportion of obstetrical patients using hospital) and one patient characterstic (race) that influenced the distance a patient would travel for obstetrical services.

2.6.2 Service Area and Service Population Models

Patient origin-destination information has been used to estimate service areas and service populations, that is, to determine by whom services are being utilized. Knowledge of the user population is essential to determine the extent of need for services, the likelihood of utilization and the volume of demand expected (MacStravic, 1978).

One of the earliest studies of this type was by Lembcke (1952) who calculated service areas based on hospital utilization for appendectomies. In calculating the incidence rates for this surgical procedure in the various hospital areas, Lembcke allocated the procedure to the patient's usual residence rather than the hospital where the patient received this service. Lembcke recognized that, while the methodology was beneficial for defining service areas served by one hospital, it had limited applicability in areas served by more than one hospital. Ten years later Poland and Lembcke extended the methodology to include areas with more than one hospital, as discussed in Griffith (1972, pp. 68-79) and Shonick (1976, pp. 65-67). The researchers defined a hospital service area as a geographically determined area containing one or more hospitals that supply most of the hospital care needs of its residents. The boundaries of the service areas were based on the concept of "equal-likelihood"; that is, the boundaries designated

the points of equal-likelihood of patients travelling to the study hospital(s) as opposed to all other hospitals.

Meade (1974) used the patient origin-destination methodology and an adaptation of the Newtonian gravity model to delineate hospital service areas in the predominantly rural state of Idaho. In the patient origin method, areas with 60 percent of its patients receiving care in a specified hospital were allocated to that hospital. The gravity model considered facility characteristics including the number of beds and physicians plus the distance from potential service areas to calculate the "drawing power" of a hospital. Meade found a high degree of congruence (96.5 percent) between the maps resulting from the patient origin methodology and the gravity model.

Once service areas were defined the next step was to calculate the service population, again using patient origin-destination information. The following studies concentrate on defining the service population, with or without definition of the corresponding service areas.

As stated by Griffith (1972, p. 75), the basic weakness of the equal-likelihood service area approach was that "the procedure approximates by dichotomous decision (in the service area or out) what is actually a much more fluid reality, a continually decreasing tendency to use a given hospital as the distance from it grows." Griffith attempted to express these realities in terms of two indices which had been labelled by Sigmond (Griffith, 1972). The relevance index (RI) referred to the proportion of patients from a certain population group who use a particular hospital while commitment index (CI) calculated the proportion of a hospital's admissions coming from a particular population group. A hospital's estimated service population was

calculated by multiplying its set of RIs by the respective population of the areas utilizing the hospital and summing across the resultant figures.

Relevance and commitment indices were refined and generalized by Bay and Nestman (1980). They demonstrated that the "service population should and can be defined without direct association with a geographic area" (p. 680). The authors demonstrated the utility of the model for planning and resource allocation on a regional and provincial level. The model was expanded to include the use of other utilization data such as patient-days and separations. Bay and Nestman then applied the methodology to 1971 Alberta hospital utilization data and compared per capita resource utilization between hospital districts.

Shaughnessy (1982) discusses two classes of methods for computing per capita measures of utilization. Community-based methods are per capita measures which pertain to the population of a specific geographic area. Measures of service utilization are summed across all providers, both within and outside the area, to determine the total utilization of a service by a specific community. The total is then divided by the population of the area to result in a per capita measurement. Provider costs and supply characteristics, such as number of beds, can also be allocated to a community on the basis of the proportion of each provider's services used by the community.

The second class of methods Shaughnessy discusses are the provider-based methods which are used to analyze utilization from the perspective of the provider. These measures reflect provider performance and show the tendency of consumers to alter their utilization practices from provider to provider. The size of a

population served by a provider (or group of providers) is calculated by summing the proportion from each community served multiplied by the population of the community. The proportion is based on the relative use of the provider's services by the community. This population is referred to as a service population and is not associated with a specific geographic area. Per capita measures are determined by dividing the total cost of the provider's services or total number of beds, for example, by this service population.

Applications of community- and provider-based methods are quite different (Shaughnessy, 1982). Community-based measures are used to assess whether a specific population is overserved or underserved with respect to hospital or nursing home beds, physicians or other health care services/providers; whether a population is characterized by high or low per capita utilization rates; or whether a population incurs a high or low cost per capita for health care services. Provider-based measures are used to address issues such as whether a provider (or group of providers) is efficient or inefficient relative to other providers in terms of per capita cost and utilization; whether a provider is characterized by high or low per capita supply measures, such as beds per capita; or whether a provider accounts for community-based per capita cost, utilization or supply differences across regions.

2.6.3 Summary

Patient origin destination studies are used to identify service areas and service populations and to facilitate regional analyses of health care utilization and resource consumption. These studies have shown that health care utilization is primarily a local phenomenon.

However, patients tend to travel greater distances for specialized services. Relevance and commitment indices were developed to summarize patient travel and to aid in the determination of service areas. The relevance index is an example of a community-based method and refers to the proportion of patients from a certain area who use a particular facility. The commitment index is an example of a provider-based method and refers to the proportion of a facilty's patients who come from a particular area. These measures are useful in comparing per capita utilization and costs between region and assessing the efficiency of one facility relative to another.

2.7 Chapter Summary

The following is a brief summary of the major points discussed in the literature review.

1) In order to conduct a proper literature review and to develop a rational methodology, a conceptual model of long-term care service utilization was proposed. Borrowing from Andersen (1975), the model suggests three sets of sequential factors that will lead to the utilization of health services: predisposing, need-related and enabling factors. Predisposing factors are those factors inherent in individuals that increase their propensity to utilize health services or, in this case, long-term care services. If one has a certain combination of predisposing factors, then one is likely to move forward along the path to institutionalization; that is, one may then have a NEED for a long-term care bed. Enabling factors are those which allow the individual to receive the care he/she needs. The factors operate on two levels: the individual and

societal levels. At an individual level the factors influence which, if any, long-term care services a specified individual will utilize. Factors at a societal level determine the overall utilization of long-term care services.

2) Most studies in the literature agree that being elderly, female or unmarried increases the risk of being institutionalized. Demographic variables indicate that residents of long-term care facilities are typically elderly unmarried women.

3) In determining whether one can receive care at home, the most important enabling factor is the availability of a support system to assist in caring for the person at home. In determining whether or not one receives institutional care as needed, the most important enabling factor is the availability of long-term care beds. Facility characteristics such as physical amenities, care programs, ethnic or religious affiliation and location can affect whether or not a potential resident will accept placement as offered.

4) The demography of the aged will have a significant impact on the need for long-term care services. Population projections indicate that there will be a dramatic increase in the elderly population in the future. Trends in the prevalence of chronic disease are more difficult to predict. Fries (1980) has predicted that the prevalence of chronic disease will decrease. However, morbidity data from the United States show that, at present, the prevalence of chronic diseases is actually increasing (Verbrugge, 1984).

5) Few studies have attempted to document the effects of long-term care bed supply on the utilization of long-term care beds. Raasok

(1979) found that areas with a large bed supply had higher utilization rates.

6) While approximately 5 percent of elderly persons are in long-term care facilities at a given time, elderly persons on average face a 15 to 30 percent lifetime risk of being admitted to such a facility (Wingard, Jones & Kaplan, 1987). Residents of long-term care facilities are not a homogeneous group. There appears to be two types of patients. Short term patients are more often young men suffering from bone fractures or cancer. Long term patients are generally elderly unmarried women, often suffering from mental illness or stroke.

7) Relatively few studies examining geographic perspectives of long-term care bed utilization exist. Evidence from these studies is contradictory and inconclusive. Further study is required.

8) Several types of inappropriate utilization of long-term care services and facilities exist. Inappropriate utilization refers to the misplacement of patients and the literature suggests that it is caused by a lack of coordination between the acute and long-term care systems and a shortage of appropriate beds and services. However, few studies have attempted to show an association between inappropriate utilization and these apparent causes. Missing from the literature are studies comparing regional variations in inappropriate utilization.

9) Patient origin-destination studies are used to identify service areas and service populations and to facilitate regional analyses of health care utilization and resource consumption. These studies have shown that health care utilization is primarily a local

phenomenon. However, patients tend to travel greater distances for specialized services.

10) Relevance and commitment indices were developed to measure the degree of patient travel and to aid in the determination of service areas. The relevance index refers to the proportion of patients from a certain area who use a particular facility while commitment index calculates the proportion of a facilty's patients who come from a particular area.

The preceding literature review has pointed out several gaps in the research of long-term care bed utilization. Specifically, research of the effects of the availability of long-term care services and beds on utilization of beds is required. As well, further research of differences in the utilization of rural and urban facilities is required. In addition, studies including nursing homes, auxiliary hospitals, and long-stay patients in acute care are virtually non-existent. Techniques used in patient origin-destination studies may be helpful in filling these gaps.

CHAPTER III

METHODOLOGY

The overall purpose of this study was to analyze utilization patterns of long-term care beds, both historically and cross-sectionally. Specific goals are outlined below. The research process undertaken to achieve these goals involved three phases: 1) development of a research strategy; 2) development and manipulation of relevant data files; and 3) application of necessary data analysis strategies. These phases are described in this chapter.

3.1 Research Strategy

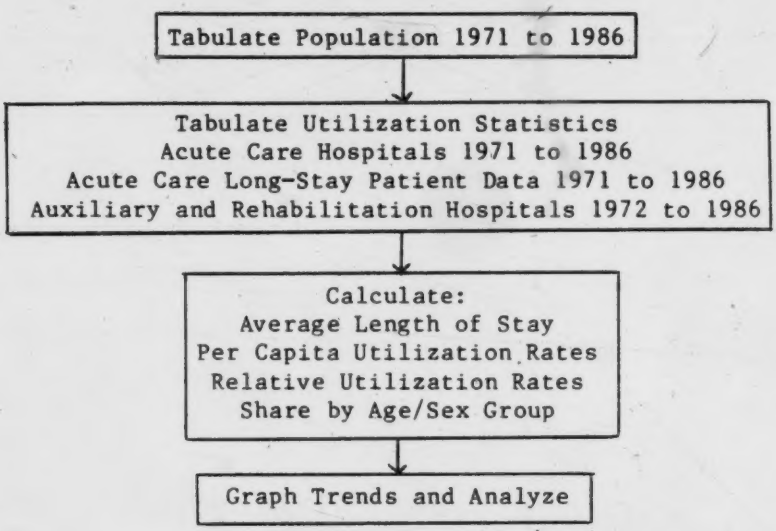
The model of long-term care bed utilization depicted in Figure 2 (Chapter 2) was used to guide research in this study. Sequence of research methodology is shown in Figure 3.

The nature of the proposed study is exploratory and descriptive. Utilization data generated by nursing homes, auxiliary hospitals and acute care hospitals will be analysed in two stages. The first stage is a historical overview of acute care, auxiliary and rehabilitation hospital utilization with specific focus on utilization by various age groups. This stage is divided into four sections. First historical trends in the population of Alberta are studied using published data from Statistics Canada. The second section is an analysis of acute care utilization from 1971 to 1986. It is hypothesized that acute care utilization by the elderly has decreased over this period as a result of better access to long-term care beds. This should be apparent in a

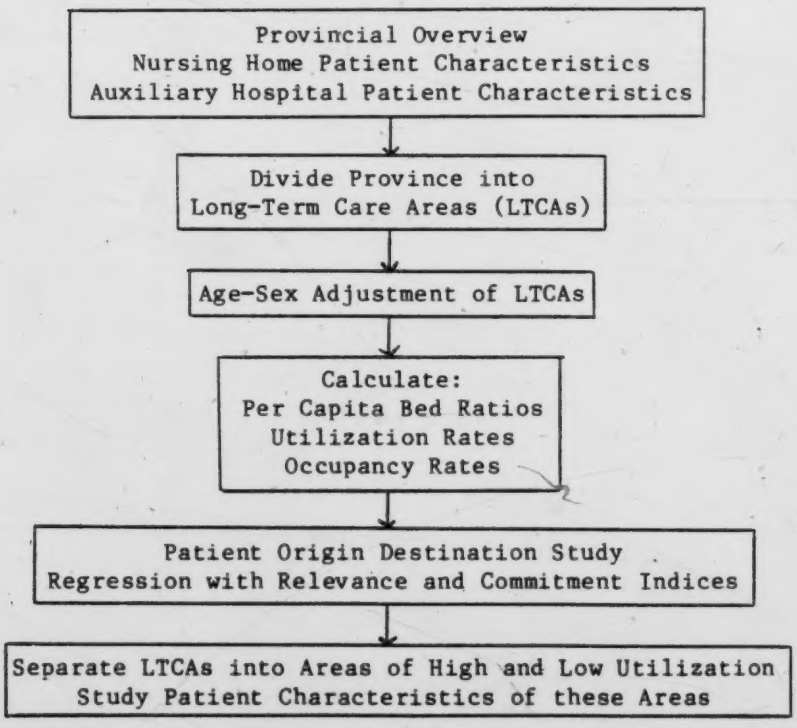
Figure 4

Sequence of Research Methodology

Stage One: Historical Analysis


Tabulate Population 1971 to 1986
Tabulate Utilization Statistics
Acute Care Hospitals 1971 to 1986
Acute Care Long-Stay Patient Data 1971 to 1986
Auxiliary and Rehabilitation Hospitals 1972 to 1986
Calculate:
Average Length of Stay
Per Capita Utilization Rates
Relative Utilization Rates
Share by Age/Sex Group
Graph Trends and Analyze

Stage Two: Cross-Sectional Analysis



decrease in the average length of stay, per capita separations and patient days utilized by the elderly.

The third section of this analysis is an overview of acute care hospital utilization by long-stay patients. Long-stay patients are defined as those patients discharged with a length of stay greater than 90 days. Again, it is hypothesized that utilization by this type of patient has decreased from 1971 to 1986 as a result of better access to long-term care beds and tighter bed control exercised by the government. The number of separations and patient days for those patients discharged after 90 days should have declined over this period.

The final section of this stage is an analysis of auxiliary and rehabilitation hospital utilization by various age groups. It is hypothesized that per capita utilization, as measured by patient days and separations, has increased in the oldest group of the elderly (those 75 and older) while per capita utilization by the young elderly (those 65 to 74) has declined. This would be indicative of more needy patients receiving care.

The second stage of the analysis is a cross-sectional study of auxiliary hospital utilization at March 31, 1986 and 1987, and nursing homes at December 31, 1986. Several types of analyses will be employed. The first is a provincial overview of auxiliary hospital and nursing home utilization. Patients in these facilities will be described in terms of age on admission, sex, marital status, and patient origin (type of previous facility/residence). Secondly, the province of Alberta will be divided into mutually exclusive and exhaustive Long-Term Care Areas (LTCAs). Utilization rates of these areas will be studied to determine what factors influence these rates. The third is a study of patient

origin-destination patterns. Raasok (1979) found that nursing home utilization was primarily a local phenomenom with some referral to regional and urban centres. This stage of the proposed study seeks to determine if these patterns still exist in nursing home utilization and if similar patterns exist in the utilization of auxiliary hospitals and to determine what community and facility characteristics are associated with patient flow patterns. The final part of the cross-sectional analyses is to describe facility and community characteristics associated with areas of high and low utilization rates of auxiliary hospitals and nursing homes.

3.2 Sources of Data

Most of data for this study were provided by Alberta Hospitals and Medical Care in the form of patient abstracts from the Professional Activity Study File and Nursing Home Annual Returns File. Historical data included age, sex and origin of all patients discharged from acute care and auxiliary hospitals from 1971 and 1972, respectively, to 1986. Cross-sectional data included age, sex and origin of all patients in auxiliary hospitals as of March 31, 1986 and 1987, and nursing homes as of December 31, 1986. Note that two types of auxiliary hospitals data were used in this study: discharge data and cross-sectional data. Alberta Hospitals and Medical Care also provided population data by hospital district for 1986. Provincial population data for 1971, 1981, and 1986 were obtained from Statistics Canada publications. Information on number of beds in all health care facilities was obtained from Annual Reports of Hospitals and Medical Care.

3.3 Data Analysis Strategies

The data analysis strategies are divided into two phases, historical and a cross-sectional phase. Each phase involves a number of smaller stages which are described below.

3.3.1 Historical Analyses

The number of separations (SEPS) and patient days (DAYS) accumulated by these separations were tabulated by age and sex groups for each available year, 1971 to 1986. The average length of stay (ALOS) was calculated by dividing DAYS by SEPS. Per capita utilization rates were calculated by dividing SEPS and DAYS by the appropriate number of persons in the corresponding population group to obtain separation rate (SEPR) and patient-day rate (DAYR), respectively. For the acute hospital utilization analysis, relative utilization measures were calculated by dividing each annual SEPR, DAYR and ALOS by the 1971 SEPR, DAYR or ALOS for the age 15 to 44 group, respectively. This procedure yielded measures that are easily compared between age groups. It also controls for factors influencing utilization that are within the system and those that are inherent in the elderly poulation. For auxiliary and rehabilitation hospitals, each age groups's utilization figures (separations and patient days) were divided by the total number of separations and patient days to yield share of utilization. This procedure was undertaken since the number of separations and patient days in these facilities is relatively small. This procedure was also employed for utilization of acute care hospitals by long-stay patients.

3.3.2 Cross-Sectional Analyses

Utilization Rates

The first step was to divide the province of Alberta into mutually exclusive and exhaustive Long-Term Care Areas (LTCAs). Each LTCA contains at least one nursing home and/or auxiliary hospital and is based on general hospital districts. Hospital districts with no long-term care facilities were aggregated with a bordering LTCA. Hospital districts with more than one long-term care facility were treated as if all facilities were the same facility. Demographic characteristics of the LTCAs were described. The next step was to calculate age/sex adjusted populations of the LTCAs using a weighted-sum approach (Bay and Nestman, 1980). The following steps were used:

1) Population for the LTCAs was tabulated by sex and five age groups (0-14, 15-44, 45-64, 65-74, and 75+). Included in this table were the number of persons from each age-sex group in nursing homes on December 31, 1986, in auxiliary hospitals on March 31, 1987, and separated from acute care hospitals with a length of stay greater than 90 days between April 1, 1985 and March 31, 1986.
2) The utilization figures were multiplied by the average cost per day of these facilities, and then divided by 1,000. The sum of these figures formed the weighted sum (WSUM) for each age-sex group.
3) The WSUM was then divided by the number of persons in the relevant age-sex group to obtain rate (RATE).
4) The rate for each age-sex group was divided by the rate for the entire population to obtain age-sex specific weights.

5) The weights were applied to the census population of the respective age-sex group in the LTCA. These figures were summed to obtain the age-sex adjusted populations for the LTCAs. This procedure is summarized in Appendix A.1.

Utilization rates were calculated as follows:

Nursing Homes:

Patients in NH in LTCA/Adjusted Population of LTCA (1)

Auxiliary Hospitals:

Patients in AH in LTCA/Adjusted Population of LTCA (2)

Similarly, bed ratios were calculated by dividing the number of beds by the age-sex adjusted population of the Long-Term Care Area. Occupancy rates of auxiliary hospitals and nursing homes were calculated by dividing the number of patients in these facilities by the number of beds available. Multiple regression was performed on the data to determine which facility and community characteristics were associated with utilization rates. Cases were weighted before the regression analysis by the population of the respective LTCA. Community characteristics tested included per capita bed ratios of auxiliary hospitals, nursing homes and lodges, utilization rates of these facilities, utilization of acute care facilities by long-stay patients and location of the LTCA (urban, regional and other). Facility characteristics included ownership, size, accreditation status and location.

Patient Flow Patterns

Patient flow patterns were quantified using relevance and commitment indices. Relevance index is the proportion of patients from a LTCA to use a particular facility while commitment index shows which LTCA's residents are using what proportion of a facility's beds. Relevance index was used to study utilization from the LTCA's perspective while commitment index was used to study utilization from the perspective of the long-term care facility (LTCF). The formulas used were as follows:

Relevance Index (RI) of LTCA to Local Long-Term Care Facility:

$$\frac{\text{Number of LTCA's Patients in Local LTCF(s)}}{\text{Total Number of Patients from LTCA in all LTCFs}} \times 100 \qquad (3)$$

Commitment Index (CI) of LTCF to Local LTCA:

$$\frac{\text{Number of Patients from Local LTCA in LTCF(s)}}{\text{Total Number of Patients in LTCF(s)}} \times 100 \qquad (4)$$

The next step in the analysis was to determine what kinds of community and facility characteristics are associated with in and out migration patterns of long-term care patients using multiple regression. Community and facility characteristics tested were those listed above.

Geographic Characteristics

The final stage of the analysis was to study the characteristics of patients from areas of high and low utilization. High utilization areas are defined as those LTCAs with a utilization rate above the provincial average while low utilization areas are LTCAs with a utilization rate below the provincial average. High utilization areas were further

divided into urban and non-urban areas. Patient characteristics include age on admission, sex and origin in terms of previous type of residence.

3.4 Chapter Summary

The methodology used to analyze long-term care bed utilization in Alberta was presented in three sections. First, the general research strategy was described. Then the sources of data necessary for the study were identified. Finally, data analysis strategies employed were detailed.

CHAPTER IV

RESULTS AND DISCUSSION

The research findings of this study are presented in five sections: 1) historical analysis of population trends and of acute care, auxiliary and rehabilitation hospital utilization trends; 2) an overview of auxiliary hospital and nursing home utilization in 1986/87; 3) description of long-term care areas; 4) a patient origin-destination study for auxiliary hospitals and nursing homes; and 5) a study of characteristics of patients from high and low utilization areas.

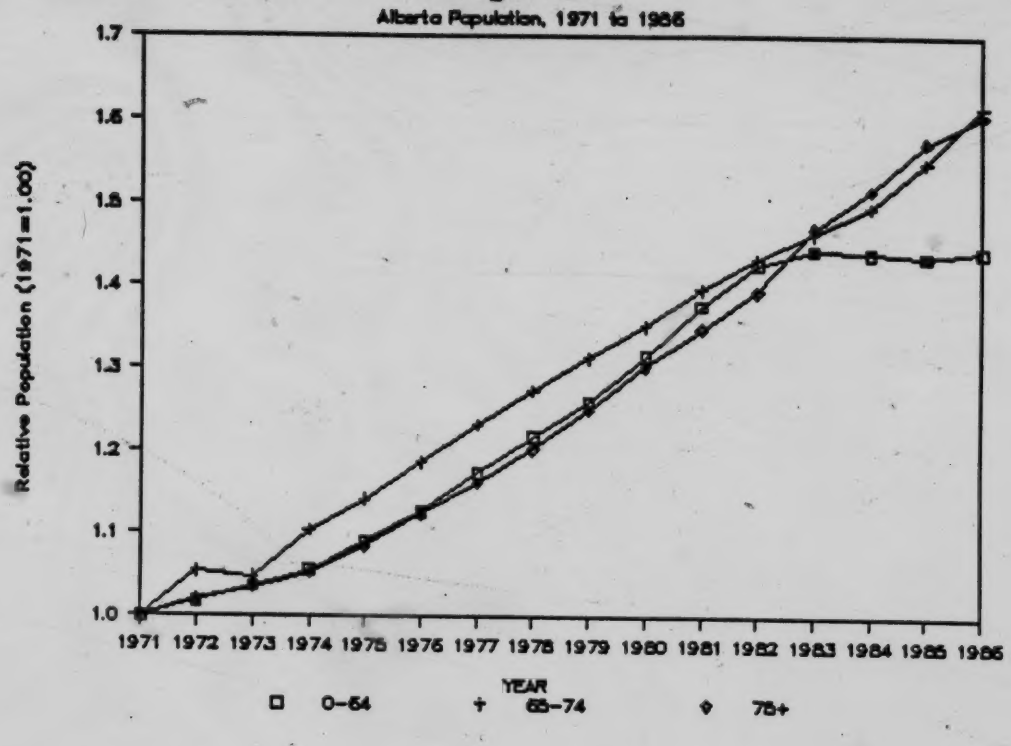
4.1 Historical Analyses

The purpose of this section is to present a historical overview of population trends, acute care, auxiliary and rehabilitation hospital utilization. First population trends in Alberta will be reviewed with special emphasis on changes in the elderly population. Overall acute care utilization patterns from 1971 to 1986 will be presented next. An analysis of separations from acute care hospitals with a length of stay greater than ninety days will be described separately. These patients are termed long-stay patients. Finally, utilization trends of auxiliary and rehabilitation hospitals from 1972 to 1986 will be presented.

4.1.1 Population Trends

The population of Alberta for 1971 to 1986 is tabulated in Appendix B.1. Alberta experienced a significant population growth from 1971 to 1982, especially during the economic boom years of 1978 to 1982, as shown in Figure 5. The population increased by 41 percent, from 1.63

Figure 5


Alberta Population, 1971 to 1986
Relative Population (1971=1.00)
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986
YEAR
0-64
65-74
75+

million to 2.32 million. This growth was primarily due to an increase in the number of persons aged 15 to 44 (Figure 5). Since 1982 the population growth has levelled off, gaining only 5.7 percent from 1981 to 1986, compared to 21.7 percent over the previous 5 years (Table 5). Unlike other population sectors, the elderly population has continued to increase steadily, by about 17 percent every 5 years since 1971 (Table 5). The percentage of elderly persons in Alberta increased from 7.3 percent to 8.1 percent. Alberta, however, is still a relatively young province with only 8.1 percent of its population being over the age of 65 compared to the national average of 10.6 percent (Statistics Canada, 1987).

4.1.2 Acute Care Hospital Utilization

Changes in per capita utilization rates and beds in acute care hospitals, relative to 1971, are shown in Figure 6 and Appendix B.2. The separation rate declined over 25 percent from 1971 to 1981. In 1982 the separation rate jumped significantly. The patient day rate declined from 1971 to 1981 by 35 percent and then rose by 5 percent in 1982. Figure 6 shows that this year marked the end of the decline in the per capita acute care bed rate. The average length of stay decreased gradually from 1971 to 1986.

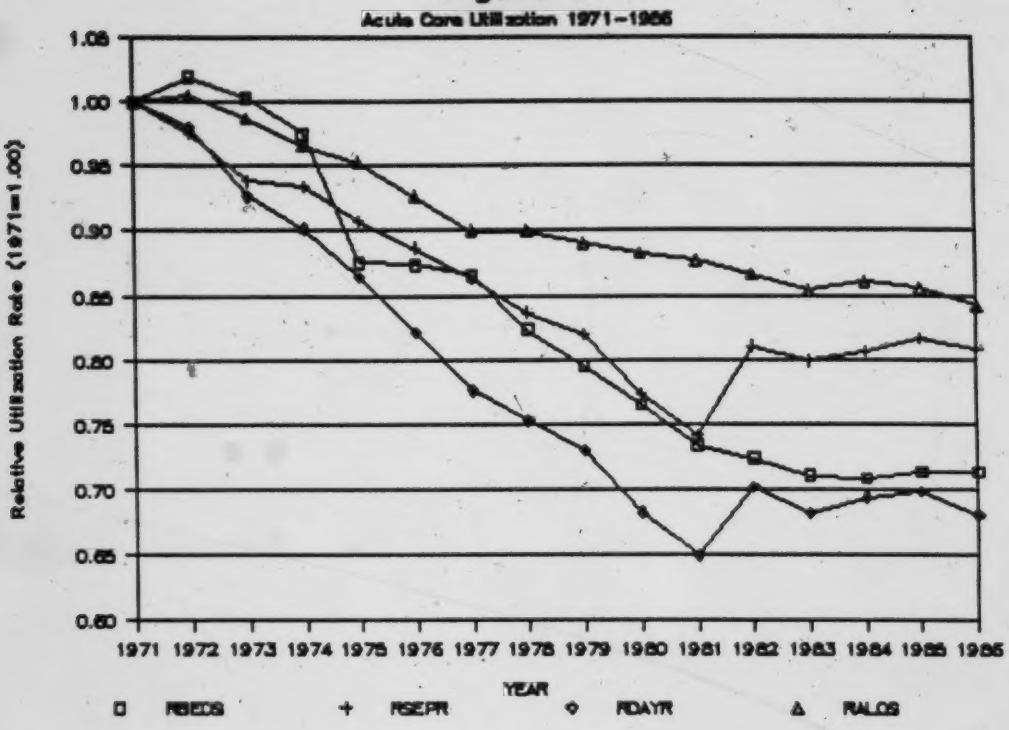
Per capita utilization rates for each age group were calculated by dividing the number of separations (or patient days) by the population of the respective age group. These age specific rates were then divided by the rate for the 15-44 age group (Appendix B.3). This procedure was undertaken to reduce the effects of system changes such as bed supply, availability of community services and funding levels. This will aid in

Table 5

Alberta Population, 1971 to 1986

	Census Population (thousands)								Percentage Change			
	1971		1976		1981		1986		1971-76	1976-81	1981-86	1971-86
	A	%	B	%	C	%	D	%	(B-A/A)	(C-B/B)	(D-C/C)	(D-A/A)
0-14	514.5	31.6	503.1	27.4	541.7	24.2	561.3	23.7	-2.21	7.66	3.63	9.10
15-44	714.8	43.9	879.0	47.8	1173.6	52.4	1222.0	51.7	22.98	33.51	4.12	70.97
45-64	279.6	17.2	317.9	17.3	359.0	16.0	391.1	16.5	13.70	12.92	8.93	39.86
65-74	72.1	4.4	85.5	4.7	100.5	4.5	116.5	4.9	18.61	17.56	15.88	61.57
75+	46.6	2.9	52.4	2.9	62.8	2.8	74.8	3.2	12.39	19.92	19.06	60.47
Total Elderly	118.7	7.3	137.9	7.5	163.4	7.3	191.3	8.1	16.17	18.46	17.10	61.14
Total Population	1627.7	100.0	1838.0	100.0	2237.7	100.0	2365.8	100.0	12.93	21.74	5.73	45.35

Figure 6


Acute Care Utilization 1971–1986
Relative Utilization Rate (1971=1.00)
1.05
1.00
0.95
0.90
0.85
0.80
0.75
0.70
0.65
0.60
1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986
YEAR
RBEDS
RSEPR
RDAYR
RALOS

controlling the effects of changes in utilization by the elderly that are caused by system changes and isolating trends inherent in the elderly population.

Figures 7 and 8 show that, in relation to the 15-44 age group, the elderly's utilization of acute care beds has increased substantially. In 1971 the 75 and over age group's separation rate was 2.5 times greater than that of the 15-44 age group. By 1986 their separation rate was 4 times that of the 15-44 age group. The young elderly (aged 65-74) also increased their relative separation rate from 1.8 to 2.3 times the rate of the 15-44 age group. The young elderly's relative patient-day utilization rate rose from 3.8 times to 5.0 times the 15-44 age group, while the old elderly's (aged 75 and over) rate rose from 7.0 times to 12.0 times that of the age 15-44 age group. The average lengths of stay (ALOS) for each age group did not change significantly relative to the 15-44 age group. The ALOS for the elderly groups were 2 and 3 times that of the 15-44 age group.

In order to compare utilization rates between the two sexes, the female utilization rates and population were divided by the appropriate figures for males (Appendix B.4). In 1986, the female utilization rates were 30 and 40 percent higher than the male rates for patient day rate and separation rate, respectively. These relative rates increased slightly from 1971 to 1986. Females, however, had a length of stay 10 percent lower than males. Women tended to have a shorter average length of stay than men because much of their hospital utilization was probably due to maternity cases, which require a relatively short hospitalization period.

Figure 7

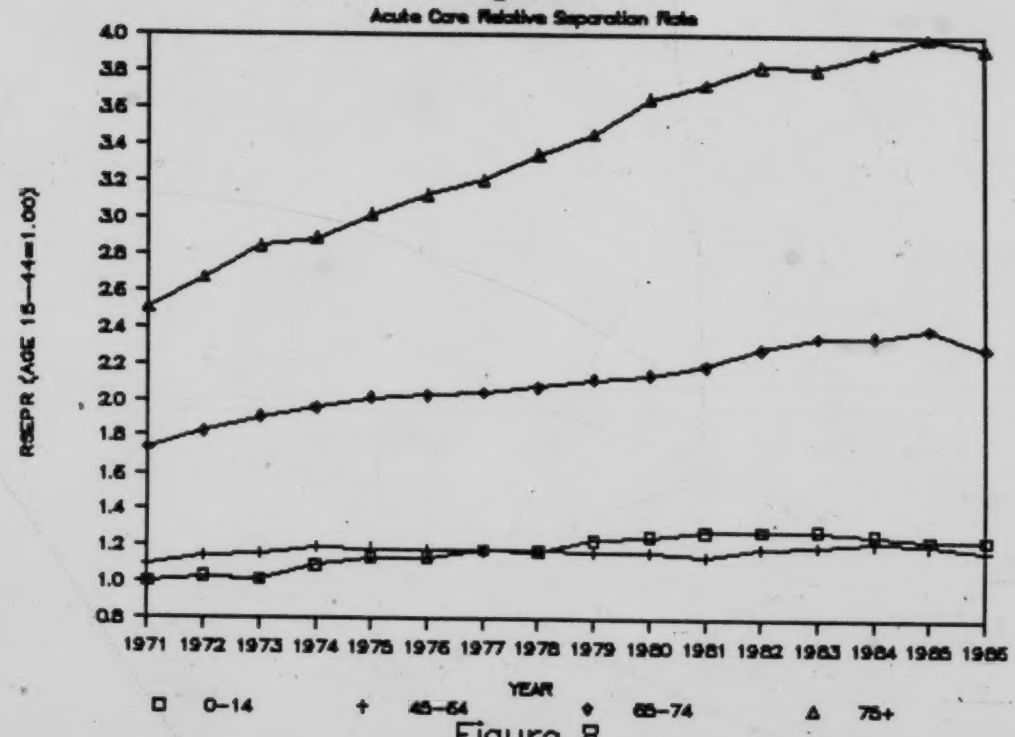
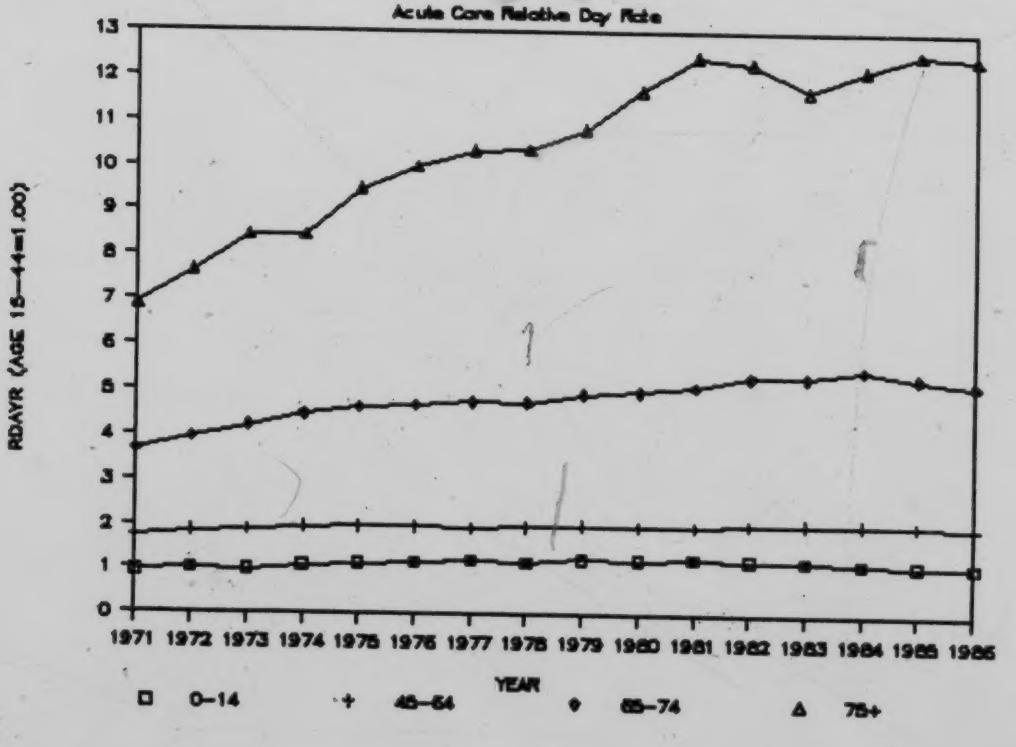


Figure 8



4.1.3 Utilization of Acute Care Hospitals by Long-Stay Patients

Utilization trends for long-stay patients separated from acute care hospitals are shown in Appendix B.5. The actual figures have been divided by the 1971 figures to identify any changes in utilization patterns over time. Changes in the elderly population are also given. The elderly population is used here for comparison since they are the primary consumers of long-stay patient days. The number of separations and patient days appear to have declined from 1971 to 1983 after an initial increase. After 1983, however, utilization seems to rise marginally. This may be due to stochastic variation rather than due to an actual increase since the number of patient abstracts is relatively small. It is interesting to note that utilization has declined while the elderly population increased over this period. Also, the jump in utilization noted in total acute care data was not apparent in the long-stay patient utilization rates.

Utilization patterns of the various age/sex groups are shown in Appendix B.6. Each age/sex group's share of separations and patient days have been calculated. The tables show that elderly females (65-74 and 75 plus) have significantly increased their share of separations and patient days, while the elderly males' share has remained approximately constant. The share of separations utilized by the 0-64 age group has decreased significantly, from a high of 28 percent in 1973 to 18 percent in 1986 for males, and from 22 percent to 15 percent for females. A similar trend was noted in the 0-64 age group's share of patient days.

These findings suggest that there has been an increase in the number of bed-blockers in acute care hospitals. While the number of patient days utilized by long-stay patients has decreased somewhat, the

proportion of these days utilized by elderly females has increased. Studies in the literature have indicated that elderly females are at the highest risk of becoming bed-blockers (McArdle, Wylie & Alexander, 1975; Murphy, 1977).

4.1.4 Auxiliary and Rehabilitation Hospital Utilization Trends

Utilization statistics for auxiliary and rehabilitation hospitals are shown in Figure 9 and Appendix B.7. Changes in the elderly population and number of beds have also been included in the figure. These are relative data in that the actual figures have been divided by the 1972 figures in order to show changes over time. Three lines show close correlation between each other. These are relative patient days (DAYS), relative elderly population (EPOP) and relative number of auxiliary and rehabilitation beds (BEDS). All of these relative figures increased 60 to 75 percent from 1972 to 1986. Regression results are shown in Table 6. Changes in the relative number of beds explained more variance in the number of patient days than did changes in the elderly population. This suggests that there is a shortage of these beds since they are filled as soon as they are available rather than utilization increasing with the population. The number of separations has not increased at the same rate as patient days or number of beds. This indicates that patients are staying longer in auxiliary and rehabilitation beds.

Shares of separations and patient days for auxiliary and rehabilitation hospitals are shown in Figures 10 and 11 and Appendix B.8. The figures show that the proportions have changed little from 1972 to 1986. Very elderly females (age 75 and over) are the largest

Figure 9

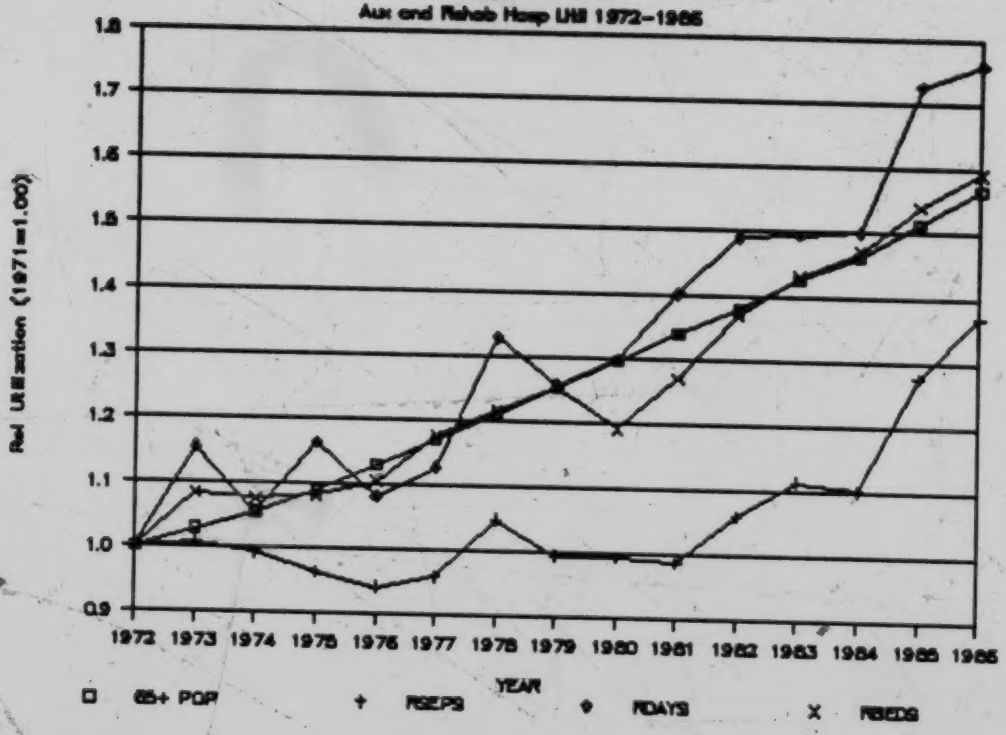

Aux and Rehab Hosp Util 1972-1985
Rel Utilization (1971=1.00)
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.9
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986
YEAR
65+ POP
RSERVS
RDAYS
RBEDS

Table 6

Results of Regression Analysis of Auxiliary and Rehabilitation Hospitals Utilization Data

Dependent Variable: Relative Patient Days, 1972 to 1986

Independent Variables:	Unstandardized Coefficients	Standardized Coefficients
Relative Elderly Population	1.24	0.96
Constant	0.92	
Squared Multiple Correlation	0.92	

Dependent Variable: Relative Patient Days, 1972 to 1986

Independent Variables:	Unstandardized Coefficients	Standardized Coefficients
Relative Auxiliary and Rehabilitation Beds	1.24	0.94
Constant	-0.24	
Squared Multiple Correlation	0.94	

Figure 10

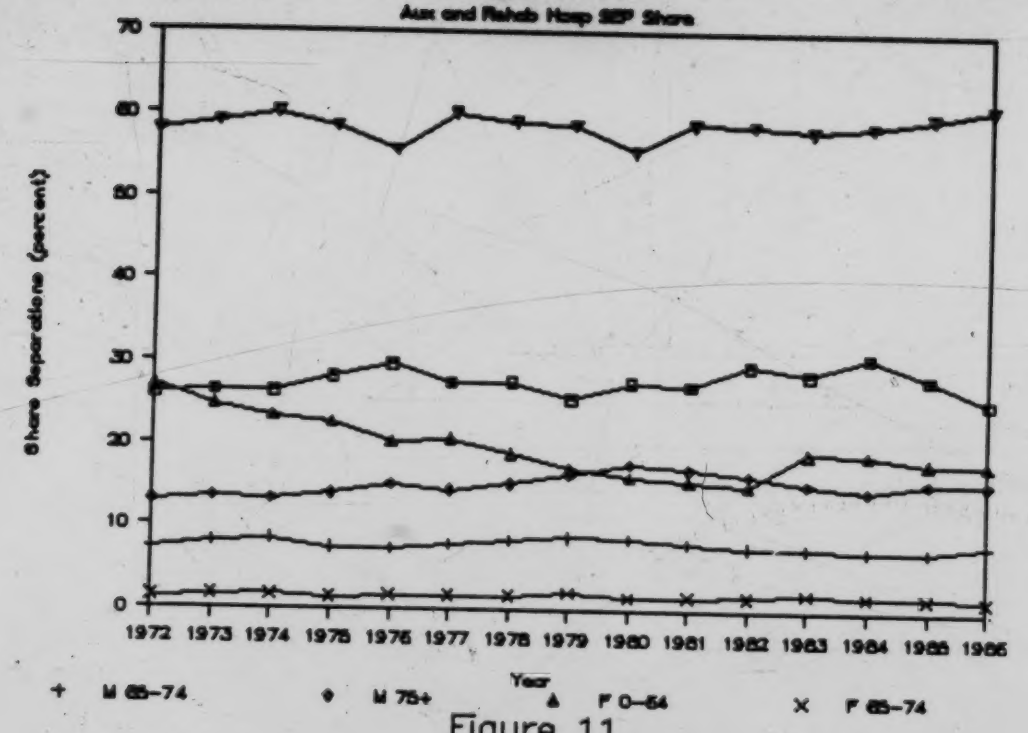
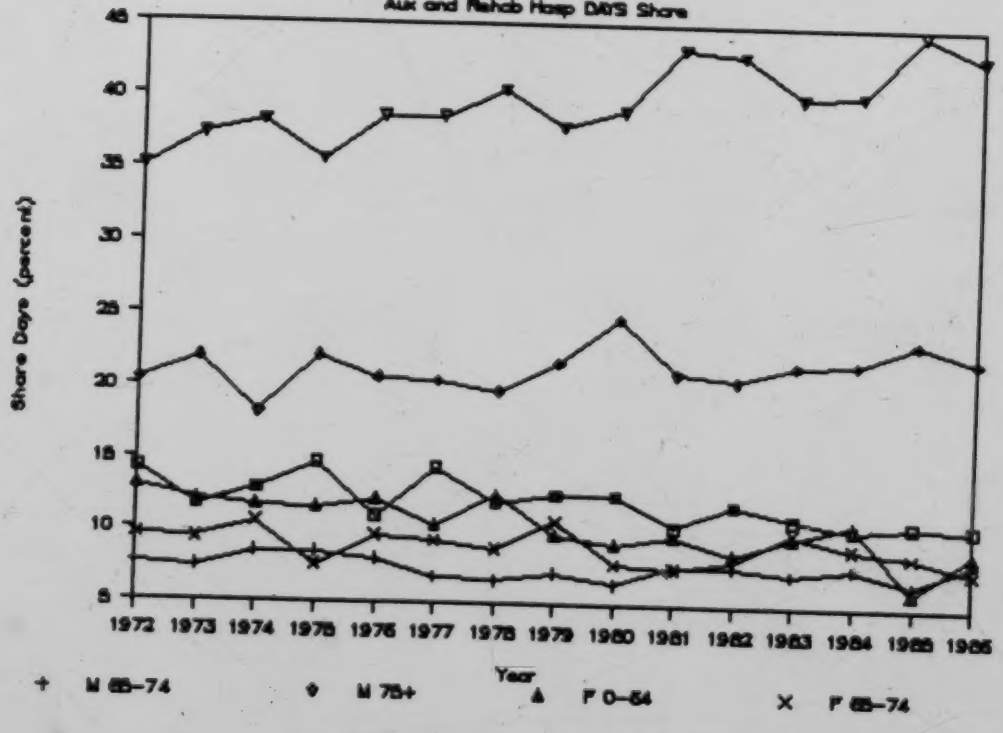


Figure 11



users of these facilities. In terms of separations, they are followed by young males and females. In terms of patient days, however, they are followed by very elderly males.

4.1.5 Summary

This study of population and utilization data has revealed several key trends. The population of Alberta increased significantly during the economic boom of 1978 to 1982 and then stabilized. The elderly population has also increased but at a slower and steadier pace. From 1971 to 1981, acute care per capita utilization remained constant in terms of separations and declined in terms of patient days, resulting in a decline in the average length of stay. In 1982, there was a large increase in per capita utilization, corresponding to the stabilization of the per capita bed ratio. The elderly used significantly more patient days and separations per capita than any other group; by 1986, for the age 75 and over, this was 4 times and 12 times, respectively, that of the age 15-44 age group.

Long-stay patients experienced different utilization patterns from the total acute care population. Overall, utilization declined over the entire period. Elderly females increased their share of long-stay separations and patient days while the non-elderly's share declined. There was not a jump in utilization in 1982 similar to that found in the general acute care data.

Utilization of auxiliary and rehabilitation hospitals, as measured by patient days, increased by 75 percent from 1972 to 1986. Separations, however have not increased to the same extent, suggesting

that patients are staying longer in these facilities. There was little change in the various age-sex groups' share of utilization.

4.2 Cross-Sectional Analysis of Long-Term Care Bed Utilization

The purpose of this section is to provide a description of the long-term care patient population in terms of a few key variables including age on admission, sex, marital status and patient origin (with respect to type of facility/residence of origin). These characteristics will be compared for the 1986 nursing home population with results from Raasok's (1979) study. Auxiliary hospital patients will be compared with nursing home residents.

4.2.1 Nursing Homes

On December 31, 1986, there were 7,674 patients in nursing homes, with an occupancy rate of 98.2 percent. Table 7 shows that more than thirty percent of these patients were over the age of 85, up 3 percent from 1976. There was a slight increase in the number of married persons in nursing homes, from 21.6 percent to 22.5 percent. A more significant change was found in the proportion of males residing in nursing homes. This proportion declined from 37.4 percent to 33.0 percent.

Rates of institutionalization declined for all age groups. A total of 3.5 percent of the elderly were residing in nursing homes in 1986, whereas the figure for 1976 was 4.2 percent. The decline was very small for those over 85, especially in comparison with the declines experienced by other age groups. The lower rates among the younger age groups could be due to a number of factors. Potential nursing home patients could be receiving care at home through the provincial Home

Table 7

Selected Characteristics of Patients in Nursing Homes, 1976 vs. 1986

	1976 (A)			1986 (B)			Change (B-A)
Beds	6,951			7,808			12.3
Patients	6,682			7,674			14.8
Occupancy Rate (%)	96.1			98.3			2.2
Total Population	1,838,040			2,365,825			28.7
65+ Population	137,925			191,325			38.7
							Change
	Number	Percent	Rate A*	Number	Percent	Rate B*	(B-A)
Age on Admission							
0-64	888	13.3	0.5	907	11.8	0.4	-0.1
65-74	1284	19.2	15.0	1342	17.5	11.5	-3.5
75-84	2705	40.5	67.8	3115	40.6	53.3	-14.6
85+	1805	27.0	144.1	2310	30.1	141.2	-2.9
Total	6682	100.0	3.6	7674	100.0	3.2	-0.4
							Change
Sex	Number	Percent	Rate A*	Number	Percent	Rate B*	(B-A)
Male	2500	37.4	2.7	2529	33.0	2.1	-0.6
Female	4182	62.6	4.6	5145	67.0	4.4	-0.2
Total	6682	100.0	3.6	7674	100.0	3.2	-0.4
	Number	Percent		Number	Percent		Change
Marital Status		(A)			(B)		(B-A)
Married	1443	21.6		1724	22.5		0.9
Non-married	5239	78.4		5950	77.5		-0.9
Total	6682	100.0		7674	100.0		0.0
	Number	Percent		Number	Percent		Change
Patient Origin		(A)			(B)		(B-A)
General Hospital	1996	29.9		2874	37.5		7.6
Aux Hospital	772	11.6		731	9.5		-2.0
Psyc Hospital	416	6.2		176	2.3		-3.9
Other Nursing Home	412	6.2		593	7.7		1.6
Sr Cit Lodge	444	6.6		427	5.6		-1.1
Private Home	2450	36.7		2483	32.4		-4.3
Other/Unknown	192	2.9		390	5.1		2.2
Total	6682	100.0		7674	100.0		0.0

*Per 1,000 Persons

Care Program and thus do not require institutional care. In this case, it may be said that the Home Care Program has reached its goal of delaying institutionalization. Alternatively, these patients may be at home with or without care, waiting for a bed because none is currently available.

Patient origin in terms of previous facility/residence changed somewhat from 1976 to 1986. More patients were admitted directly from acute care hospitals in 1986 and fewer from private homes, auxiliary hospitals, psychiatric hospitals and senior citizens lodges. This, together with the higher occupancy rate of nursing homes suggests that acute care hospitals have become waiting areas for patients too ill to return home.

4.2.2 Auxiliary Hospitals

On March 31, 1987, there were 4,838 patients in auxiliary hospitals (Table 8). Almost 65 percent of these patients were over the age of 75. More than two percent of persons over the age of 65 were residing in auxiliary hospitals at that time. Over 60 percent of these patients were female, and females had a higher rate of institutionalization than males. The most common marital status was widowed followed by married, then single. The majority of auxiliary hospital patients (64.6 percent) were admitted from acute care hospitals. Nursing homes and private homes were also important referral sources for auxiliary hospital patients.

Few similarities between nursing home and auxiliary hospital patients with respect to patient characteristics were found. There were similar proportions of persons aged 65 to 74 and 85 and over in both

Table 8

Selected Characteristics of Patients in Auxiliary Hospitals

Beds	5013
Patients	4838
Occupancy Rate (%)	96.5

Age on Admission	Number	Percent	Rate *
0-64	842	17.4	0.4
65-74	860	17.8	7.4
75-84	1686	34.8	28.8
85+	1450	30.0	88.6
Total	4838	100.0	2.0
Total 65+	3996	82.6	20.9 **

Sex	Number	Percent	Rate *
Male	1903	39.3	1.6
Female	2935	60.7	2.5
Total	4838	100.0	2.0

Marital Status	Number	Percent
Single	913	18.9
Married	1605	33.2
Widowed	2096	43.3
Divorced/Separated	224	4.6
Total	4838	100.0

Patient Origin	Number	Percent
General Hospital	3127	64.6
Other Aux Hospital	242	5.0
Psyc Hospital	36	0.7
Nursing Home	720	14.9
Sr. Cit Lodge	79	1.6
Private Home	597	12.3
Other/Unknown	37	0.8
Total	4838	100.0

*Per 1,000 Persons except where noted
** Per 1,000 Persons Aged 65+

types of facilities (approximately 17.5 and 30.0 percent respectively). Nursing homes had a larger proportion of persons aged 75 to 84 while auxiliary hospitals admitted more non-elderly patients.

4.2.3 Summary

A number of changes have occured since Raasok's study with respect to characteristics of nursing home patients. The proportions of elderly patients and of females has increased. Rates of institutionalization for all age groups have declined. Significantly more patients were admitted from general hospitals, suggesting that acute care facilities have become temporary residences for patients waiting to receive nursing home care. A large number of auxiliary hospital patients were also admitted from acute care hospitals, suggesting that many of these patients are also waiting in acute care hospitals for auxiliary hospital beds.

4.3 Long-Term Care Areas

For the purpose of this study, the province of Alberta was divided into 65 mutually exclusive and exhaustive Long-Term Care Areas (LTCAs). Hospital districts were combined such that there was at least one nursing home or auxiliary hospital in each LTCA. This resulted in 65 geographically and demographically different LTCAs, as shown in Figure 12 and Appendix B.9. Three auxiliary wings report their utilization data with their respective general hospitals, resulting in the deletion of these facilities from the analysis of long-term care bed utilization. These three auxiliary wings total 33 beds. There were 16 LTCAs, accounting for 6.5 percent of the population, with only auxiliary

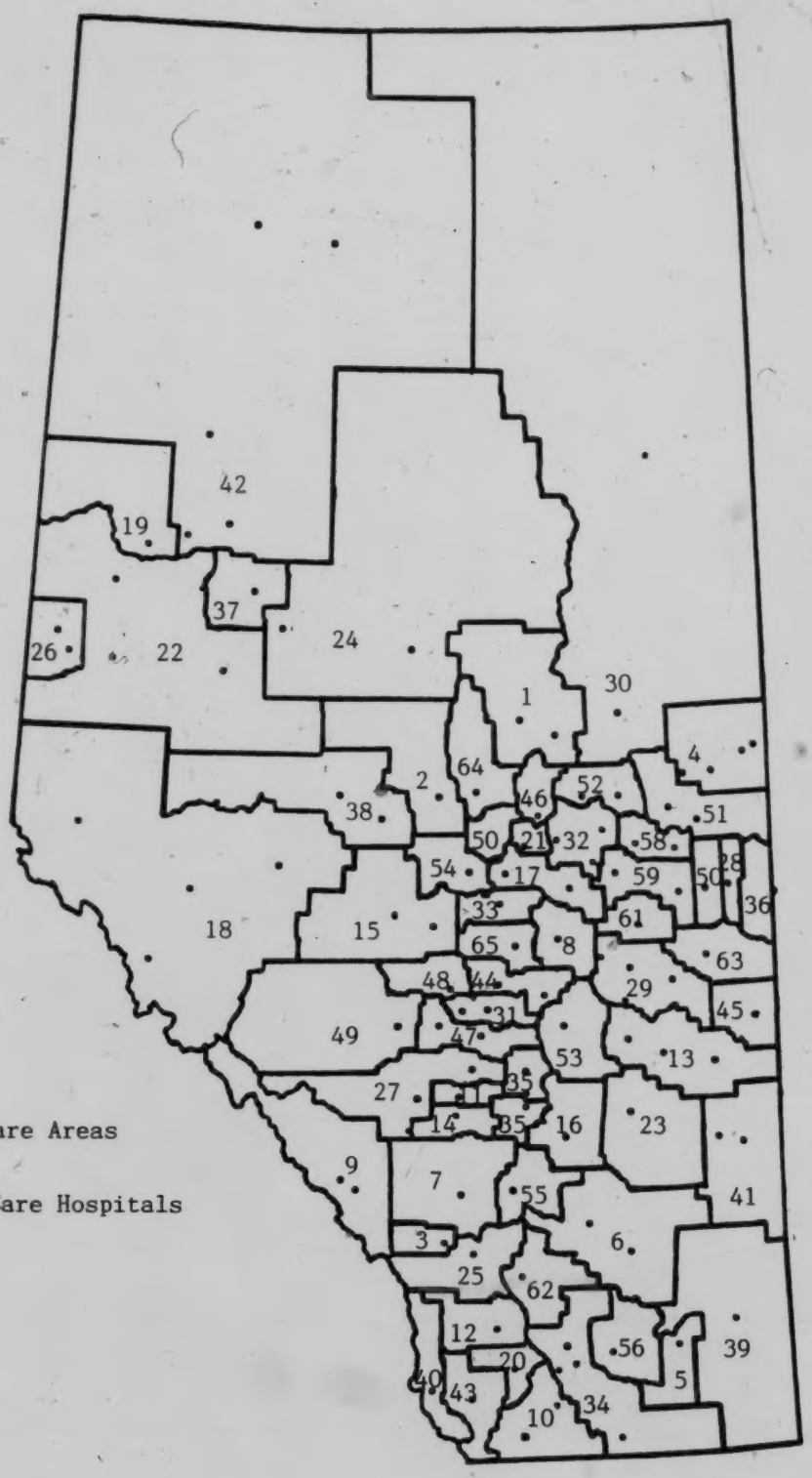


Figure 12

Long-Term Care Areas

• Acute Care Hospitals

hospitals, and 19 LTCAs, accounting for 11.4 percent of the population, with only nursing homes. These LTCAs are all in rural Alberta, and, together account for 50.8 percent of the rural population.

4.3.1 Demographic Characteristics of LTCAs

The population of Alberta was 2.36 million as of June 30, 1986 (Appendix B.9). The population of the various LTCAs ranged from 1,960 people to 675,515 people with a median of 11,110. The province had an overall average of 8.1 percent of persons aged 65 and over, with a range of 2.3 to 21.0 percent in the LTCAs. Figure 13 shows the distribution of the elderly in the province. The elderly are concentrated in rural areas of the province, particularly in the northeastern and central areas. The large urban centres of Edmonton and Calgary have relatively low proportions of elderly, 7.9 and 6.8 percent, respectively.

4.3.2 Age and Sex Adjustments of LTCA Populations

The distribution of the elderly population in terms of both numbers and sex ratios has significant implications for patterns of long-term care bed utilization given the importance of age and sex in influencing the demand for long-term care. Therefore, in order to make comparisons among LTCAs meaningful, it was necessary to adjust the population of each LTCA to account for age and sex disparities. The methodology utilized in the age-sex adjustment is given in Appendix A.1. Census (unadjusted) and adjusted populations are given in Appendix B.9. Those LTCAs with higher proportions of elderly persons were given inflated populations compared with their census population. Ratios of age-sex

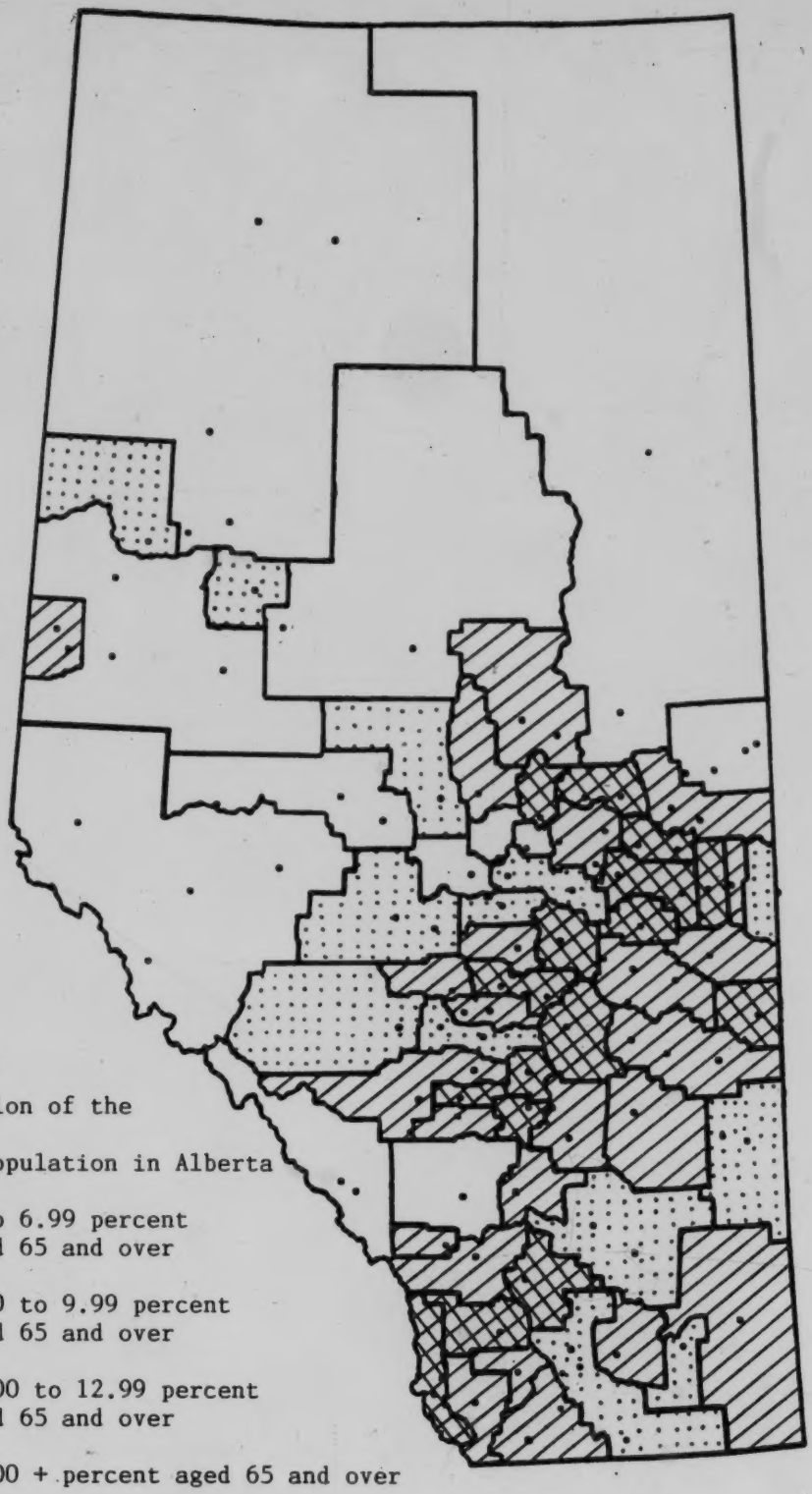


Figure 13

Distribution of the

Elderly Population in Alberta

0 to 6.99 percent aged 65 and over

7.00 to 9.99 percent aged 65 and over

10.00 to 12.99 percent aged 65 and over

13.00 + percent aged 65 and over

adjusted populations to census populations ranged from 0.6 to 1.9, reflecting demographic diversity of Alberta.

4.3.3 Distribution of Long-Term Care Beds in LTCAs

As of March 31, 1987, Alberta had 7,868 nursing home beds and 5,013 auxiliary hospital beds, for bed ratios of 3.33 and 2.12 beds per 1,000 capita, respectively. Per capita distribution, using age-sex adjusted populations, are shown in Figure 14 and Appendix B.10. These ratios range from 0.92 to 12.2 beds per 1,000 capita, with 12 LTCAs (accounting for 4.8 percent of the total population) having a bed ratio higher than 125 percent of the provincial average. Areas with high bed ratios are in northeastern and central Alberta. These areas have already been identified as areas with high concentrations of elderly persons. There were 20 LTCAs (accounting for 7.8 percent of the total population) with a bed ratio lower than 75 percent of the provincial average. Areas with low bed ratios are northern and western regions. Most of these areas tend to be sparsely populated and have a predominantly young population because of oil and other resource extraction industries. Others are located next to areas of high concentration of long-term care beds. Collectively, long-term care beds appear to be relatively evenly distributed throughout the province.

4.3.4 Utilization Rates of Long-Term Care Beds

As discussed earlier, the provincial utilization rates for auxiliary hospitals and nursing homes were 2.02 and 3.21 per 1,000 capita, respectively. Table 9 shows that people living in areas without nursing homes have lower utilization rates of these facilities than

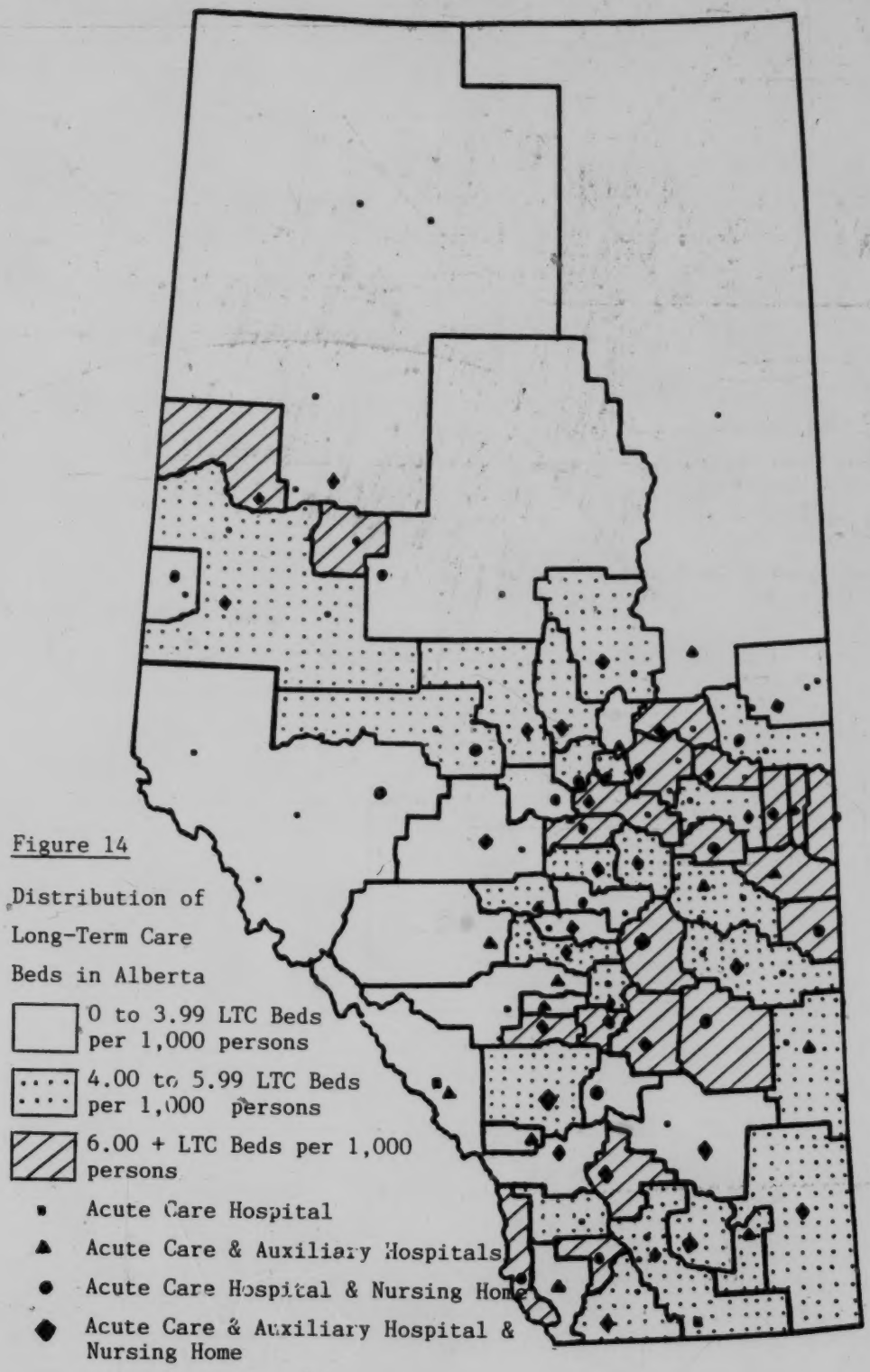

0 to 3.99 LTC Beds per 1,000 persons
4.00 to 5.99 LTC Beds per 1,000 persons
6.00 + LTC Beds per 1,000 persons
Acute Care Hospital
Acute Care & Auxiliary Hospitals
Acute Care Hospital & Nursing Home
Acute Care & Auxiliary Hospital & Nursing Home

Figure 14

Distribution of Long-Term Care Beds in Alberta

Table 9

Long-Term Care Bed Utilization 1986/87

	Utilization Rates*		
	AUXILIARY HOSPITALS	NURSING HOMES	COMBINED
Areas with Both Auxiliary Hospitals and Nursing Homes (32)	2.14	3.30	5.51
Areas with Only Auxiliary Hospitals (15)	3.00	1.23	4.23
Areas with Only Nursing Homes (18)	0.65	3.69	4.34
Provincial Total (65)	2.03	3.21	5.24

*Per 1,000 Persons (Age-Sex Adjusted Populations)

those with nursing homes and higher utilization rates of auxiliary hospitals. The opposite is true of people from areas without auxiliary hospitals. This suggests that there is a degree of substitution of one type of facility for the other.

Utilization rates of long-term care beds are shown in Figure 15 and Appendix B.10. The rates are origin specific, that is, they are based on utilization of long-term care beds by persons from a specific LTCA rather than in a specific LTCA. Most of eastern and central Alberta experienced high utilization rates, while western and northern areas experienced low utilization rates. The areas of high utilization are concurrent with the distribution of the elderly population.

Multiple regression was used to identify facility and community characteristics associated with utilization rates. Auxiliary hospitals and nursing homes were analyzed separately and results are shown in Table 10.

The regression model for auxiliary hospital utilization rate (AHUR) contains only two variables, namely per capita auxiliary hospital beds and occupancy rate. Together these two varibles explain 87.2 percent of the variance in AHUR. Both variables have positive regression coefficients. As expected, utilization rate increases with an increase in the supply of beds. And, as utilization increase, the occupancy rate of auxiliary hospitals increase. The high R square value shows the powerful influence of bed supply on auxiliary hospital utilization rates, suggesting a possible shortage of these beds since they are filled as soon as they are available.

The regression equation for nursing home utilization rate (NHUR) included two other variables in addition to per capita bed supply and

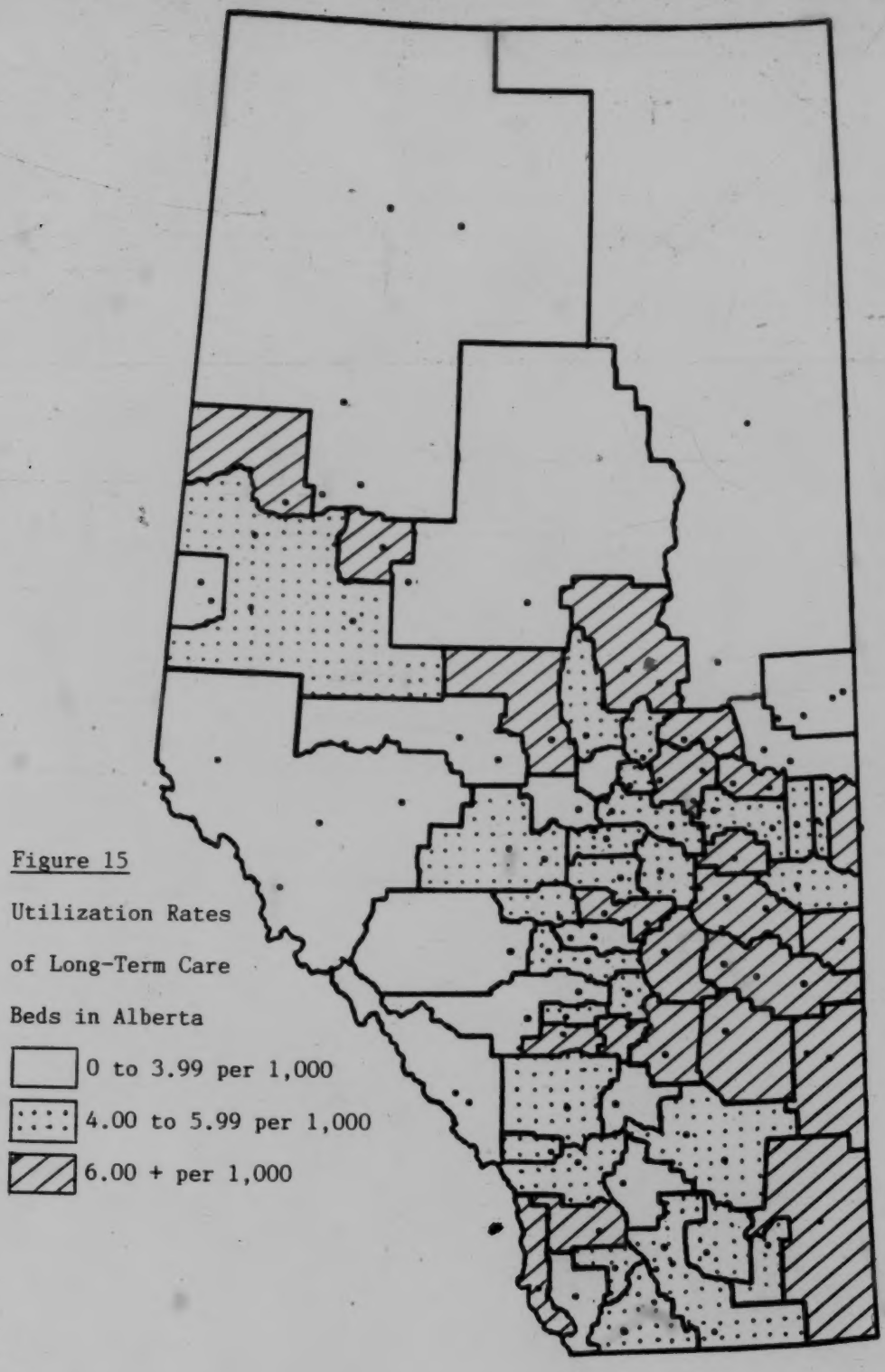


Figure 15

Utilization Rates of Long-Term Care Beds in Alberta

Table 10

Factors Influencing Utilization Rates

Dependent Variable: Auxiliary Hospital Utilization Rate*

Independent Variables:	Unstandardized Coefficients	Standardized Coefficients
Per Capita Auxiliary Hospital Beds	0.67	1.00
Occupancy Rate	1.49	0.31
Constant	-0.87	
Squared Multiple Correlation	0.87	

Dependent Variable: Nursing Home Utilization Rate*

Independent Variables:	Unstandardized Coefficients	Standardized Coefficients
Per Capita Nursing Home Beds	0.69	0.82
Rural Location	0.29	0.26
Occupancy Rate	3.54	0.30
Long-Stay Acute Care Separation Rate	-0.35	-0.20
Constant	-2.23	
Squared Multiple Correlation	0.64	

*Weighted by population of Long-Term Care Area

occupancy rate, namely rural location and long-stay acute care separation rate. Together these variables explained 64.1 percent of the variation in NHUR. This relatively low R square indicates that there are other factors not measured by these variables that influence nursing home utilization rate. Rural location had a positive regression coefficient in the NHUR equation, indicating that rural areas experienced relatively higher utilization rates. This could be a result of less formal and informal support services being available in rural areas for the ill and frail elderly, forcing these persons to seek care in nursing homes. Long-stay acute care separation rate had a negative regression coefficientin the NHUR equation. This suggests that when utilization rates are low, probably due to lower per capita bed supply, acute care hospitals are used to accommodate patients requiring nursing home care.

4.3.5 Summary

The province of Alberta was divided into 65 mutually exclusive and exhaustive Long-Term Care Areas (LTCAs). The resulting areas were demographically and geographically diverse. Areas with high concentrations of elderly persons consisted of northeastern and central areas. To account for the demographic differences, the population of the individual LTCAs were age-sex adjusted. The per capita distribution of long-term care beds was somewhat uneven, with high bed ratios found in northeastern and central Alberta.

Utilization rates also showed much variation, with areas of high bed ratios also having high utilization rates. There also appeared to be some degree of substitution of one type of long-term care bed for

another, as areas without nursing home beds had higher rates of auxiliary hospital utilization and vice versa for areas without auxiliary hospitals. The results of the regression analysis indicated that the primary factor explaining the variation in auxiliary hospital utilization was the bed supply. In addition to bed supply, rural location and long-stay acute care utilization also influenced the nursing home utilization rates.

4.4 Patient Origin-Destination Analysis

This section is an analysis of patient origin-destination patterns. Its purpose is to identify community and facility characteristics that influence patients's care-seeking patterns. Patient flow patterns were studied from the community's perspective using relevance indices and from the facilitiy's perspective using commitment indices.

4.4.1 Relationship Between LTCA Characteristics and RI

Relevance index (RI) is the proportion of patients from a LTCA to use a particular facility. This study is concerned only with the Relevance Index of an LTCA's population to the local long-term care facility. The majority of patients remained in their own LTCA to receive institutional long-term care as shown by the high relevance indices in Appendix B.11. The table also shows considerable variation in RIs between LTCAs. The data were analyzed using multiple regression to identify LTCA characteristics associated with relevance index. The characteristics used as independent variables were: occupancy rate of long-term care facilities, long-term care bed supply, lodge unit supply and utilization, location (urban, rural, regional centre), utilization

rates of long-term care facilities and utilization rate of acute care hospitals by long-stay (measured by separation and patient day rates). All population-based rates used age-sex adjusted populations. Urban centres included Edmonton and Calgary while regional centres included Lethbridge, Medicine Hat, Red Deer and Grand Prairie. Rural areas are all other areas of the province. For the regression analysis, the data and RIs were weighted by the population in the respective LTCA. The analyses were performed separately for auxiliary hospitals and nursing homes.

The regression equation yielding the highest R square (explained variation) for auxiliary hospital relevance index (AHRI) is shown in Table 11. These five variables explained 58.3 percent of the variation in AHRI. Urban location had a positive regression coefficient while rural location had a negative coefficient in the equation, indicating that rural patients are more likely to leave their home area to receive care than urban patients. This could be due to a number of factors such as specialized facilities available in urban centres, more beds available in urban centres, and previous emigration of family from rural areas. Per capita bed ratio had a positive regression coefficient in the AHRI equation. As the availability of beds increases, the likelihood of a patient being able to remain in his/her own LTCA increases. Finally, occupancy rate had a negative regression coefficient while utilization rate had a positive regression coefficient in the AHRI equation. As the utilization rate rises, fewer patients are able to remain in their own LTCA for care. Areas with low occupancy rates are likely able to attract patients from other areas, thus decreasing the relevance index.

Table 11

Factors Influencing Relevance Indices

Dependent Variable: Auxiliary Hospital Relevance Index*

Independent Variables:	Unstandardized Coefficients	Standardized Coefficients
Urban Location	0.08	0.39
Rural Location	-0.06	-0.29
Per Capita Auxiliary Hospital Beds	0.10	1.00
Occupancy Rate	0.28	0.40
Auxiliary Hospital Utilization Rate	-0.11	-0.74
Constant	0.63	
Squared Multiple Correlation	0.58	

Dependent Variable: Nursing Home Relevance Index*

Independent Variables:	Unstandardized Coefficients	Standardized Coefficients
Rural Location	-0.04	-0.13
Per Capita Nursing Home Beds	0.24	1.14
Nursing Home Utilization Rate	-0.23	-0.92
Occupancy Rate	0.82	0.28
Long-Stay Acute Care Patient Day Rate	-0.00	-0.38
Long-Stay Acute Care Separation Rate	0.10	0.22
Urban Location	0.05	0.23
Per Capita Auxiliary Hospital Beds	-0.02	-0.12
Constant	0.10	
Squared Multiple Correlation	0.92	

*Weighted by population of Long-Term Care Area

Very similar results were found in the multiple regression equation of nursing home relevance index (NHRI) as shown in Table 11. In addition to the variables corresponding to those found related to AHRI, three others were also included for the NHRI regression equation. Auxiliary hospital bed supply had a negative regression coeffient in the NHRI equation, that is, patients were more likely to remain in their own LTCA for nursing home care when auxiliary hospital beds were in short supply. This could be explained in two different manners. First, auxiliary bed supply could be negatively correlated with nursing home utilization. Areas with no auxiliary beds are more likely to have high nursing home utilization (Section 4.3.4). Areas with high auxiliary bed ratios are less likely to have nursing home beds, forcing potential nursing home patients to other areas for care, thus decreasing the NHRI. A second explanation would be that in areas with low auxiliary hospital bed supply, potential auxiliary patients are admitted to nursing homes, thus artificially increasing the nursing home relevance index and utilization rate. The other two factors in the NHRI regression equation measure acute care utilization and contradict each other, as one had a negative coefficient while the other had a positive coefficient in the NHRI regression equation.

4.4.2 Relationship Between LTC Facility Characteristics and CI

Commitment Index (CI) is the proportion of patients in a long-term care facility from a particular LTCA. This study utilizes only CIs of a long-term care facility to the local LTCA. Long-term care facilities admitted primarily patients from their own areas as shown by the high commitment indices in Appendix B.11. As with relevance indices this

table shows considerable variation in the values for commitment indices. The data were analyzed using multiple regression to identify what characteristics were associated with commitment index. In addition to the independent variables used in the relevance index regression model, the following characteristics were also used: ownership of facility (district, private or rural), accreditation status and size of facility. All population-based measures utilized age-sex adjusted populations. The data and CIs were weighted by the number of auxiliary hospital beds in the respective LTCA for the auxiliary hospital regression equation and by the number of nursing home beds in the respective LTCA for the nursing home commitment index equation. Results are shown in Table 12.

Areas with higher per capita auxiliary bed supplies and higher occupancy rates in nursing homes were more likely to attract auxiliary hospital patients from other areas as shown by their negative regression coefficients. Areas with a larger supply of auxiliary beds are naturally more likely to have room for patients from other areas. As for the higher occupancy in nursing homes, perhaps the spouses of incoming auxiliary hospital patients were already receiving care in nursing homes in the Long-Term Care Area. Two variables had positive regression coefficients in the auxiliary hospital commitment index regression equation, namely size of facility and religious ownership. These were both unexpected results. It was expected that facilities with religious ownership would attract patients from a greater distance as was found in Raasok's study (1979) of nursing home utilization patterns. Larger auxiliary hospitals were also expected to attract patients from outside their own LTCA since they may be able to offer specialized services. However, due to the powerful influence of bed

Table 12

Factors Influencing Commitment Indices

Dependent Variable: Auxiliary Hospital Commitment Index to own LTCA*

Independent Variables:	Unstandardized Coefficients	Standardized Coefficients
Per Capita Auxiliary Hospital Beds	-0.06	-0.65
Size Auxiliary Hospital	0.00	0.24
Occupancy Rate Nursing Homes	-0.54	-0.30
Religious Ownership	0.05	0.28
Constant	1.51	
Squared Multiple Correlation	0.73	

*Weighted by Number of Auxiliary Hospital Beds in LTCA

Dependent Variable: Nursing Home Commitment Index to own LTCA*

Independent Variables:	Unstandardized Coefficients	Standardized Coefficients
District Ownership	0.22	0.59
Private Ownership	0.08	0.27
Nursing Home Utilization Rate	0.10	0.65
Per Capita Nursing Home Beds	-0.06	-0.62
Occupancy Rate	-0.38	-0.12
Constant	0.88	
Squared Multiple Correlation	0.78	

*Weighted by Number of Nursing Home Beds in LTCA

supply on utilization rates (section 4.3.4) these correlations may be spurious since patients appear to take the first bed offered.

The regression equation for nursing home commitment index (NHCI) contained five variables, explaining 77.5 percent of the variance in NHCI (Table 12). Per capita nursing home beds and occupancy rate of nursing homes were associated with a lower commitment index; that is, with a larger influx of patients from other LTCAs. District and private ownership were associated with higher commitment index, indicating that these facilities are less likely to attract patients from other areas compared to religiously owned facilities. This concurs with Raasok's study. Facilities located in LTCAs with high utilization rates also had high commitment indices. These facilites were probably full with patients from their own LTCA and therefore unable to accept patients from other areas.

4.4.3 Summary

Relevance and commitment indices to local LTCAs were, in general, very high, indicating that patients prefered to remain in their home LTCA to receive long-term care. Overall, 90 percent of auxiliary hospital and 84 percent of nursing home patients remained in their home LTCA. There was considerable variation in RIs and CIs for both auxiliary hospitals and nursing homes. Factors accounting for variation in RIs included geographic location, bed supply, occupancy rate and utilization rates. For CIs, type of ownership, size of facility, utilization rates, bed supply and occupancy rates accounted for some of the variation.

4.5 Characteristics of Patients from High and Low Utilization Areas

The final section of the analysis deals with characteristics of patients from high and low utilization areas. Areas of high utilization were defined as areas whose population had a utilization rate above the provincial mean (5.24 per 1,000 capita in auxiliary hospitals and nursing homes combined). High utilization areas were separated into high use rural and regional centres, and urban areas. Raasok (1979) found more significant differences when she divided the areas thus. Characteristics analyzed were age on admission, sex, marital status and patient origin in terms of previous type of residence. No judgment has been made as to the appropriateness of these high and low utilization rates. As discussed earlier, the data available to this study were not appropriate to that type of analysis.

4.5.1 Auxiliary Hospitals

A larger proportion of non-elderly persons utilized auxiliary hospitals in urban centres than in rural and regional centres (Table 13). This was expected for two reasons. Urban areas have a larger proportion of non-elderly persons than the rest of the province. Secondly, urban centres have specialized facilities such as the Glenrose, that treat young accident victims and young handicapped persons. Therefore, a higher proportion of young persons are expected to utilize facilities in urban areas. Rural areas and regional centres admitted a larger proportion of elderly and very elderly persons. There was little difference between the proportion of males and females admitted in the three types of areas.

Table 13

Characteristics of Auxiliary Hospital Patients from High and Low Utilization Areas

	High Use Areas Urban		High Use Areas Rural & Regional		Low Use Areas Rural & Regional		Alberta Total	
Age on Admission	Number	Percent	Number	Percent	Number	Percent	Number	Percent
0-64	557	19.6	123	12.6	162	16.0	842	17.4
65-74	519	18.2	165	16.9	176	17.4	860	17.8
75-84	965	33.9	357	36.5	364	35.9	1686	34.8
85+	807	28.3	332	34.0	311	30.7	1450	30.0
Total	2848	100.0	977	100.0	1013	100.0	4838	100.0

Chi Square = 32.5 Significance < .00

Sex	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Male	1088	38.2	385	39.4	430	42.4	1903	39.3
Female	1760	61.8	592	60.6	583	57.6	2935	60.7
Total	2848	100.0	977	100.0	1013	100.0	4838	100.0

Chi Square = 5.7 Significance = .06

Marital Status	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Single	539	19.2	181	18.7	193	19.4	913	19.1
Married	892	31.8	342	35.4	371	37.2	1605	33.7
Widowed	1255	44.7	425	44.0	416	41.8	2096	44.0
Divorced	120	4.3	18	1.9	16	1.6	154	3.2
Separated	42	1.5	11	1.1	17	1.7	70	1.5
Total	2848	100.0	977	100.0	1013	100.0	4838	100.0

Chi Square = 33.5 Significance < .00

Patient Origin	Number	Percent	Number	Percent	Number	Percent	Number	Percent
General Hospital	1820	63.9	666	68.2	641	63.3	3127	64.6
Other Aux Hosp	161	5.7	38	3.9	43	4.2	242	5.0
Psyc Hospital	15	0.5	16	1.6	5	0.5	36	0.7
Nursing Home	454	15.9	126	12.9	140	13.8	720	14.9
Sr Cit Lodge	7	0.2	28	2.9	44	4.3	79	1.6
Private Home	380	13.3	93	9.5	124	12.2	597	12.3
Other/Unknown	11	0.4	10	1.0	16	1.6	37	0.8
Total	2848	100.0	977	100.0	1013	100.0	4838	100.0

Chi Square = 138.9 Significance < .00

Differences existed in the proportion of married persons admitted in urban and non-urban areas. Urban centres admitted fewer married patients and more divorced patients. Significant differences were also noted in patient origin in terms of type of previous residence. High use rural and regional areas admitted a larger proportion of patients from general hospitals and fewer from long-term care facilities, lodges and private homes. This suggests that acute care facilities may be serving as waiting areas for patients requiring auxiliary hospitals beds in these areas. It was surprising, then that this proportion was somewhat smaller in urban areas. A recent article in an Edmonton newspaper told of a four year wait for a couple to be reunited in the same auxiliary hospital, and that there was a 22 month wait for a bed in any auxiliary facility (Moore, 1988). One would expect, then, that there would also be a small fraction of patients transfered from one auxiliary facility to another in urban centres, yet urban centres had the highest proportion of transfer patients. However, given the distance between auxiliary hospitals in other areas of the province, it is unlikely that many patients in these areas would wish to transfer.

4.5.2 Nursing Homes

Chi Square tests were also performed on nursing home data and results are shown in Table 14. There were no significant differences at an alpha=0.05 level in age on admission between high and low utilization areas. Urban areas, however, admitted more females than rural and regional centres. Perhaps in urban areas there is little informal care available for unmarried elderly females. Table 14 shows that urban centres also admitted fewer married patients, confirming that many urban

Table 14

Characteristics of Nursing Home Patients from High and Low Utilization Areas

	High Use Areas Urban		High Use Areas Rural & Regional		Low Use Areas Rural & Regional		Alberta Total	
Age on Admission	Number	Percent	Number	Percent	Number	Percent	Number	Percent
0-64	516	12.8	196	11.1	195	10.4	907	11.8
65-74	719	17.9	299	16.9	324	17.3	1342	17.5
75-84	1610	40.0	729	41.3	768	40.9	3107	40.5
85+	1176	29.2	543	30.7	591	31.5	2310	30.1
Total	4021	100.0	1767	100.0	1878	100.0	7666	100.0

Chi Square = 11.2 Significance = .08

Sex	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Male	1221	30.3	636	36.0	672	35.7	2529	33.0
Female	2806	69.7	1131	64.0	1208	64.3	5145	67.0
Total	4027	100.0	1767	100.0	1880	100.0	7674	100.0

Chi Square = 26.7 Significance < .00

Marital Status	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Single	521	13.5	237	13.9	242	13.5	1000	13.6
Married	834	21.6	448	26.2	442	24.7	1724	23.4
Widowed	2343	60.7	984	57.5	1065	59.6	4392	59.7
Divorced	160	4.1	42	2.5	39	2.2	241	3.3
Separated	81	2.1	16	0.9	35	2.0	132	1.8
Total	3939	100.0	1727	100.0	1823	100.0	7489	100.0

Chi Square = 42.6 Significance < .00

Patient Origin	Number	Percent	Number	Percent	Number	Percent	Number	Percent
General Hospital	1436	36.5	710	41.1	728	39.9	2874	38.4
Aux Hospital	332	8.4	209	12.1	190	10.4	731	9.8
Psyc Hospital	74	1.9	59	3.4	43	2.4	176	2.4
Other Nursing H	457	11.6	53	3.1	83	4.6	593	7.9
Sr. Cit Lodge	147	3.7	148	8.6	132	7.2	427	5.7
Private Home	1432	36.4	479	27.7	572	31.4	2483	33.2
Other/Unknown	61	1.5	69	4.0	75	4.1	205	2.7
Total	3939	100.0	1727	100.0	1823	100.0	7489	100.0

Chi Square = 314.4 Significance < .00

nursing home patients are unmarried women. Studies in the literature have shown that unmarried elderly women are at higher risk of being institutionalized than those in other age-sex groups (eg. Greenberg & Ginn, 1979; Kraus et al., 1976a; Shapiro & Tate, 1985). Differences in marital status and sex between high and low utilization non-urban centres were negligible.

There were large differences in previous type of residence between all groups of areas. Urban centres admitted significantly more patients from other nursing homes and private homes. The high proportion of transfer patients compared to auxiliary hospitals, indicates a greater relative availability of nursing home beds in urban areas. In fact, compared to rural and regional areas, urban centres admit significantly fewer nursing home patients from care facilities, indicating a greater availability of these beds in urban areas compared to other areas; that is, patients were not forced to wait in care facilities such as general hospitals for a nursing home bed, rather, patients were admitted directly from their homes. Alternatively more community services are available in urban centres, and thus patients are able to wait at home. There were also differences between high and low rural and regional utilization areas. High utilization areas admitted more patients from general, auxiliary and psychiatric hospitals and lodges, while low utilization areas admitted more patients from private homes.

Raasok (1979) found striking differences in characteristics of patients in rural and regional areas of high and low utilization rates. These differences were less remarkarble in the present study, especially with respect to age on admission and sex.

4.5.3 Summary

Auxiliary hospitals in urban areas tended to admit a larger proportion of non-elderly divorced or widowed patients. More urban patients came from private homes, nursing homes and other auxiliary hospitals. Non-urban high utilization areas had larger proportions of patients over 75 years and patients dischaged from general hospitals. Low utilization areas admitted more male patients and fewer widowed patients.

Urban centres admitted more females, fewer married patients, and more patients from other nursing homes and private residences. Differences between non-urban high and low utilization areas were very small, especially compared to Raasok's findings. There were significantly more transfer patients in nursing homes than in auxiliary hospitals.

4.6 Chapter Summary

The results from the historical and cross-sectional analyses were presented and discussed in this chapter. A summary of major findings is given in section 5.2 of the next chapter.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Summary

In light of the continually increasing elderly population, rising costs of long-term care and questions about the appropriateness of institutional care, the utilization of long-term care facilities merits investigation. There has not been a study of long-term care bed utilization in Alberta since 1979 and that study included only nursing homes. A number of important changes have been implemented in Alberta's long-term care system since then, including increasing the availability of community-based services and the construction of more long-term care beds in rural Alberta. In the literature, most studies have examined only one aspect of long-term care services such as nursing home care or long-stay patients in acute care hospitals and few have studied geographic variations in utilization. This study was designed to fill many of these gaps. Long-term care bed utilization was examined from several perspectives. First, a historical analysis of relevant acute care hospital and auxiliary and rehabilitation hospital utilization was completed. A cross-sectional analysis of utilization data from the full range of institutional care services available was performed. Factors influencing patient travel patterns and utilization rates were also examined.

A conceptual model of long-term care service utilization was proposed in order to conduct a proper literature review and develop a rational research methodology. The model suggests three sets of sequential factors that lead to the utilization (or non-utilization) of

long-term care services, including predisposing, need-related and enabling factors. These factors operate on an individual and a societal level. A review of current research concluded that predisposing factors leading to utilization of long-term care services include being elderly, female and unmarried. Health-status was the primary need-related factor cited in the literature. The prevalence of chronic illness appears to be increasing at this point in time; however, a controversial but plausible theory by Fries (1980) suggests that this trend will be reversed. The most important enabling factor cited was the availability of long-term care services, community-based and institutional, formal and informal. These factors determine whether or not an individual will receive care at an appropriate level. Approximately 5 percent of elderly persons are in long-term care facilities at a given time in Canada and the United States. Techniques used in patient origin-destination studies have rarely been used in examining long-term care bed utilization in spite of their proven merit in acute care utilization studies.

The data analyses were conducted in two phases. First, historical analyses of population trends and of the utilization of acute care, auxiliary and rehabilitation hospitals was completed. Second, a detailed cross-sectional analysis of auxiliary hospital and nursing home utilization was performed. This phase consisted of four smaller stages: 1) an overview of auxiliary hospital and nursing home utilization in 1986/87; 2) description of long-term care areas; 3) patient origin-destination study; and 4) a study of characteristics of patients from high and low utilization areas.

5.2 Major Findings

A summary of the major findings from the analysis is listed below:

1) The elderly's utilization of patient days and separations in acute care hospitals increased in the period from 1971 to 1986, while overall utilization of these facilities declined. Utilization of acute care hospitals by long-stay patients declined. Elderly women have increased their share of these patient days.

2) Utilization of auxiliary and rehabilitation hospitals increased by 75 percent in terms of patients days. Separations have not increased, indicating that patients are staying longer in these facilities.

3) Since Raasok's study, the proportion of elderly patients and female patients in nursing homes has increased. Rates of utilization for all age groups have declined, particularly those for the young elderly.

4) A significantly higher proportion of nursing home patients were admitted directly from acute care hospitals in 1986 compared to 1976. A large proportion of 1987 auxiliary hospital patients were also admitted from acute care hospitals. This suggests that acute care hospitals are being used as waiting places for prospective nursing home and auxiliary hospital patients.

5) Patients in auxiliary hospitals and nursing homes were similar with respect to age on admission. However, they were disimilar in all other patient characteristics examined.

6) Areas with large proportions of elderly persons also had a large long-term care supply and high utilization rates. These areas were northeastern and central Alberta.

7) It appears that the primary factor in explaining variations in utilization rates of long-term care beds was bed supply. For nursing homes, rural location and long-stay acute care separation rate also explained some of the variation.

8) Overall, 90 percent of auxiliary hospital and 84 percent of nursing home patients were receiving care in the facility nearest their home. Some of the variation in relevance indices was accounted for by the following factors: geographic location, bed supply, occupancy rate and utilization rates. Some of the variation in commitment indices was accounted for by: size and ownership of facility, utilization rates, bed supply and occupancy rates.

9) Characteristics of long-term patients in high and low utilization areas in urban and non-urban areas showed few significant differences.

5.3 Conclusions

The objectives of this study were: 1) to predict possible changes in the elderly's utilization of long-term care beds; 2) to identify mutable trends in utilization to reduce rates of institutionalization, where appropriate; 3) to identify any inequities in the distribution of long-term care beds; and 4) to monitor the effects of changes in Alberta's long-term care system. In view of these objectives and of the research findings in this investigation, the following conclusions were made:

1) There was wide-spread evidence to indicate that the number of bed blockers in acute care hospitals is increasing and is a significant problem in Alberta. The evidence included the rise in the

utilization of long-stay patient days by elderly females. The proportion of nursing home patients admitted from acute care hospitals rose significantly. Areas with low nursing home utilization and low bed supply also had high rates of utilization of acute care facilities by long-stay patients, suggesting a substitution of acute care facilities for nursing homes when the latter were unavailable.

2) Changes in the utilization of auxiliary and rehabilitation beds from 1972 to 1986 were primarily due to changes in the number of beds, suggesting a shortage of these beds. This investigation was replete with evidence of this shortage. The cross-sectional analysis also showed that bed supply played a major role in determining the utilization rates of long-term care beds and in patient travel patterns.

3) The decline in the rate of institutionalization of the young elderly could be caused by: 1) the increase in the availability of community-based long-term care services resulting in a decline of their need for institutional care or 2) the decrease in the number of beds resulting in the young elderly's needs being overlooked in light of the greater needs of the old elderly.

4) There was little evidence to suggest that the distribution of long-term care beds in Alberta was inequitable. Rather, most areas of the province appear to be experiencing severe shortages of beds. There were areas with relatively lower bed to population ratios but they also had smaller numbers of elderly persons or were located close to areas of high bed ratios.

5.4 Recommendations

Recommendations based on the major findings and conclusions of this investigation are provided below.

1) The number of long-term care beds in Alberta should be increased. In order to determine the number of beds required and where they should be located, a needs assessment of patients on waiting lists and in acute care beds is necessary.

2) In future, long-term care bed planning should be based on age-sex specific guidelines since these two variables are easily measured and are the primary predisposing determinants of need.

3) Assessment and placement procedures of elderly patients in acute care beds should be reviewed and adjusted to prevent patients from being left indefinitely in acute care facilities.

4) Further investigation of rural to urban migration patterns for long-term care is required to determine why patients leave rural areas for care. If patients are leaving because of a lack of facilities in rural areas, then the number of beds in rural areas should be increased. If patients are leaving because of previous emigration of family or similar reasons, then this should be accounted for in bed planning guidelines by increasing the number of beds in urban areas.

5) Studies similar to this should be conducted periodically to identify changes in utilization patterns.

6) The federal government should consider a periodic health survey of Canada to assess health care needs and monitor the prevalence of chronic disease. In addition to assisting in the evaluation of how our health care dollars are spent in every sector of the health

care system, this type of information is vital in determining unmet needs for long-term care.

REFERENCES

Alberta Coordinated Home Care Program. (1987). Coordinated Home Care Program Annual Report, 1985-86. Edmonton: Alberta Social Services and Community Health (Draft).

Alberta Hospitals and Medical Care. (1988). Annual Report, 1986-87. Edmonton: Alberta Hospitals and Medical Care.

Alberta Hospitals and Medical Care. (1987). Annual Report, 1985-86. Edmonton: Alberta Hospitals and Medical Care.

Alberta Hospitals and Medical Care. (1986). Annual Report, 1984-85. Edmonton: Alberta Hospitals and Medical Care.

Alberta Hospitals and Medical Care. (1985). Annual Report, 1983-84. Edmonton: Alberta Hospitals and Medical Care.

Alberta Hospitals and Medical Care. (1984). Annual Report, 1982-83. Edmonton: Alberta Hospitals and Medical Care.

Alberta Hospitals and Medical Care. (1983). Annual Report, 1981-82. Edmonton: Alberta Hospitals and Medical Care.

Alberta Hospitals and Medical Care. (1982). Annual Report, 1980-81. Edmonton: Alberta Hospitals and Medical Care.

Alberta Hospitals and Medical Care. (1981). Annual Report, 1979-80. Edmonton: Alberta Hospitals and Medical Care.

Alberta Hospitals and Medical Care. (1980). Annual Report, 1978-79. Edmonton: Alberta Hospitals and Medical Care.

Alberta Mortgage and Housing Corporation. (1987). Summary Findings: Senior Citizens Lodge Program Review. Alberta Municipal Affairs (Draft).

Andersen, R., Kravitz, J. & Anderson, O.W. (1975). Equity in Health Services: Empirical Analyses in Social Policy. Cambridge, Mass.: Ballinger Publishing Company.

Bay, K.S. & Nestman, L.J. (1980). A hospital service population model and its application. International Journal of Health Services, 10, 677-695.

Berg, R.L., Browning, F.E., Hill, J.G. & Wenkert, W. (1970). Assessing the health needs of the aged. Health Services Research, 5, 36-59.

Branch, L.G. & Jette, A.M. (1982). A prospective study of long-term care institutionalization among the aged. American Journal of Public Health, 72, 1373-1379.

Canadian Medical Association. (1987). Health Care for the Elderly; Today's Challenges, Tomorrow's Options. Ottawa: Canadian Medical Association.

Cape, R.D.T., Shorrock, C., Tree, R., Pablo, C., Campbell, A.J. & Seymour, D.G. (1977). Square pegs in round holes: A study of residents in long-term institutions in London, Ontario. Canadian Medical Association Journal, 117, 1284-1287.

Ciocco, A. & Altenderfer, M.E. (1945). Birth statistics as an index of interdependence of counties with regard to medical services. Public Health Reports, 60, 973-985.

Cohen, M.A., Tell, E.J. & Wallack, S.S. (1986). The lifetime risks and costs of nursing home use among the elderly. Medical Care, 24, 1161-1172.

Committee on Long Term Care for Senior Citizens. (1988). A New Vision for Long Term Care: Meeting the Need. Edmonton, Alberta: Government of Alberta.

Dominion Bureau of Statistics. (1968). Population 1921-1966: Revised Annual Estimates of Population By Sex and Age, Canada and the Provinces. Ottawa: Minister of Trade and Commerce.

Davis, J.W. & Gibbin, M.J. (1971). An area-wide examination of nursing use, mis-use, and non-use. American Journal of Public Health 61, 1146-53.

Dunlop, B.D. (1976). Need for, and utilization of, long-term care among elderly Americans. Journal of Chronic Disease, 29, 75-87.

Falk, S. (1971). Average length of stay in long-term care institutions. Health Services Research, 6, 251-255.

Fries, J.F. (1980). Aging, natural death, and the compression of morbidity. New England Journal of Medicine, 303, 130-135.

Fries, J.F. (1983). The compression of morbidity. Milbank Memorial Fund Quarterly, 61, 397-419.

Greenberg, J. & Ginn, A. (1979). A multivariate analysis of the predictors of long-term care placement. Home Health Services Quarterly, 1, 75-99.

Greene, V. (1984). Premature institutionalization among the rural elderly in Arizona. Public Health Reports, 99, 58-63.

Griffith, J.R. (1972). Quantitative Techniques for Hospital Planning and Control. Toronto: Lexington Books.

Hall, D. & Bytheway, B. (1982). The blocked bed: Definition of a problem. Social Science and Medicine, 16, 1985-1991.

Hasiuk, A.M. (1987). Diagnostic-Specific Acute Care Hospital Utilization by the Elderly. Unpublished master's thesis. Department of Health Services Administration and Community Medicine, University of Alberta.

Jackson, J.A. (1985). Factors associated with the care of the elderly. Canadian Journal of Public Health, 76, 255-58.

Kane, R.L., Olsen, D.M., Thetford, C. & Byrnes, N. (1976). The use of utilization review records as a source of data on nursing home care. American Journal of Public Health, 66, 778-82.

Kastenbaum, R.S. & Candy, S. (1973). The 4% fallacy: A methodological and empirical critique of extended care facility program statistics. International Journal of Aging and Human Development, 4, 15-21.

Keeler, E.B., Kane, R.L. & Solomon, D.H. (1981). Short- and long-term residents of nursing homes. Medical Care, 19, 363-69.

Kraus, A.S., Spasoff, R.A., Beattie, E.J., Holden, D.E.W., Lawson, J.S., Rodenburg, M. & Woodcock, G.M. (1976a). Elderly applicants to long-term care institutions. I. Their characteristics, health problems and state of mind. Journal of the American Geriatrics Society, 24, 117-125.

Kraus, A.S., Spasoff, R.A., Beattie, E.J., Holden, D.E.W., Lawson, J.S., Rodenburg, M. & Woodcock, G.M. (1976b). Elderly applicants to long-term care institutions. II. The application process, placement and care needs. Journal of the American Geriatrics Society, 24, 165-172.

Lembcke, P.A. (1952). Measuring the quality of medical care through vital statistics based on hospital service areas: Comparative study of appendectomy rates. American Journal of Public Health, 42, 276-286.

Lesnoff-Caravaglia, G. (1978-1979). The five percent fallacy. International Journal of Aging and Human Development, 9, 187-192.

Liu, K. & Manton, K. (1983a). The characteristics and utilization pattern of an admission cohort of nursing patients. The Gerontologist, 23, 91-98.

Liu, K. & Manton, K. (1983b). The length-of-stay pattern of nursing home admissions. Medical Care, 21, 1211-1222.

Liu, K. & Manton, K. (1984). The characteristics and utilization pattern of an admission cohort of nursing home patients (II). The Gerontologist, 24, 70-76.

Liu, K. & Palesch, Y. (1981). The nursing home population: Different perspectives and implications for policy. Health Care Financing Review, 3, 15-23.

MacStravic, R.E. (1978). Determining Health Needs. Ann Arbor, Michigan: Health Administration Press.

Manton, K., Liu, K. & Cornelius, E.S. (1985). An analysis of the heterogeneity of U.S. nursing home patients. Journal of Gerontology, 40, 34-46.

Markson, E.W., Steel, K. & Kane, E. (1983). Administratively necessary days: More than an administrative problem. The Gerontologist, 23, 486-492.

Meade, J. (1974). A mathematical model for deriving hospital service areas. International Journal of Health Services, 4, 353-364.

McArdle, C., Wylie, J.C. & Alexander, W.D. (1975). Geriatric patients in an acute medical ward. British Medical Journal, 4, 568-569.

McCoy, J.L. & Edwards, B.E. (1981). Contextual and sociodemographic antecedents of institutionalization among aged welfare recipients. Medical Care, 19, 907-921.

McGuirk, M.A. & Porell, F.W. (1984). Spatial patterns of hospital utilization: The impact of distance and time. Inquiry, 21, 84-95.

Moore, E. (1988). Elderly Couple Reunited After 4 Years. Edmonton Journal, September 15, A1.

Murphy, F.W. (1977). Blocked Beds. British Medical Journal, 1, 1395-1396.

Palmore, E. (1976). Total chance of institutionalization among the aged. The Gerontologist, 16, 504-507.

Raasok. S.M. (1979). Nursing Home Bed Utilization in Alberta: A Patient Origin-Destination Study. Unpublished master's thesis. Department of Health Services Administration and Community Medicine, University of Alberta.

Roemer, M. (1961). Bed supply and hospital utilization: A natural experiment. Hospitals, 35(November), 36-42.

Romeril, C. (1984). Utilization of Acute Care Hospital Pediatric Services in Alberta. Unpublished master's thesis. Department of Health Services Administration and Community Medicine, University of Alberta.

Scanlon, W.J. (1980). Nursing home utilization patterns: Implications for policy. Journal of Health Politics, Policy and Law, 4, 619-641.

Schwenger, C.W. (1975). The geriatric crisis in Canada: Real or imagined? The Journal of Long-Term Care Administration, 3, 22-28.

Senior Citizens Bureau. (1987). Older Persons in Alberta: Their Use of Programs and Services. Edmonton: Alberta Social Services.

Shapiro, E. & Roos, L.L. (1984). Using health care: Rural/urban differences among the Manitoba elderly. The Gerontologist, 24, 270-274.

Shapiro, E. & Roos, N.P. (1981). The geriatric long-stay hospital patient: A Canadian case study. Journal of Health Politics, Policy and Law, 1, 49-55.

Shapiro, E., Roos, N.P. & Kavanagh, S. (1980). Long term patients in acute care beds: Is there a cure? The Gerontologist, 20, 342-349.

Shapiro, E. & Tate, R.B. (1985). Predictors of long-term care facility use among the elderly. Canadian Journal on Aging, 4, 11-19.

Shapiro, E. & Webster, L.M. (1984). Nursing home utilization patterns for all Manitoba admissions, 1974-1981. The Gerontologist, 24, 610-15.

Sharp, L.J. & McCarthy, W.T. (1971). Patient origin study. Northwest Medicine, 70, 838-841.

Shaughnessy, P.W. (1982). Methodological issues in per capita measurement in health care. Health Services Research, 17, 61-81.

Shonick, W. (1976). Elements of Planning for Area-wide Personal Health Services. Saint Louis, MS.: The C.V. Mosby Company.

Smyer, M.A. (1980). The differential usage of services by impaired elderly. Journal of Gerontology, 35, 249-255.

Spasoff, R.A., Kraus, A.S., Beattie, E.J., Holden, D.E.W., Lawson, J.S., Rodenburg, M. & Woodcock, G.M. (1978). A longitudinal study of elderly residents of long-stay institutions. The Gerontologist, 18, 281-292.

Statistics Canada. (1979). Revised Annual Estimates of Population by Marital Status, Age and Sex for Canada and the Provinces, 1971-1976. Ottawa: Minister of Supply and Services.

Statistics Canada. (1982). 1981 Census of Canada: Age, Sex and Marital Status, Canada, the Provinces, Urban Size Groups, Rural Non-Farm and Rural Farm. Ottawa: Minister of Supply and Services.

Statistics Canada. (1983). Intercensal Annual Estimates of Population by Marital Status, Age and Sex for Canada and the Provinces, 1976-1981. Ottawa: Minister of Supply and Services.

Statistics Canada. (1985). Population Projections for Canada, Provinces and Territories. Ottawa: Minister of Supply and Services.

Statistics Canada. (1985). Postcensal Annual Estimates of Population by Marital Status, Age, Sex and Components of Growth for Canada, Provinces and Territories, June 1, 1984. Ottawa: Minister of Supply and Services.

Statistics Canada. (1986). Postcensal Annual Estimates of Population by Marital Status, Age, Sex and Components of Growth for Canada, Provinces and Territories, June 1, 1985. Ottawa: Minister of Supply and Services.

Statistics Canada. (1987). Population: Demographic Characteristics, 5 Year Age Groups. Ottawa: Minister of Supply and Services.

Studnicki, J. (1975). The minimization of travel effort as a delineating influence for urban hospital service areas. International Journal of Health Services, 5, 679-693.

Szafran, O. (1985). Utilization of Acute Care Hospitals by the Elderly in Alberta. Unpublished master's thesis. Department of Health Services Administration and Community Medicine, University of Alberta.

Teixeira, C.A. (1975). A Review of Methods of Estimating Hospital Service Population. Unpublished non-thesis paper. Division of Health Services Administration, University of Alberta.

Toll, K.A. (1982). Hospital Bed Utilization by Levels of Care in Alberta. Unpublished master's thesis. Department of Health Services Administration and Community Medicine, University of Alberta.

Treas, J. (1977). Family support systems for the aged: Some social and demographic considerations. The Gerontologist, 17, 486-491.

Verbrugge, L.M. (1984). Longer life but worsening health? Trends in health and mortality of middle-aged and older persons. Milbank Memorial Fund Quarterly, 62, 475-519.

Vincente, L., Wiley, J. & Carrington, R.A. (1979). The risk of institutionalization before death. The Gerontologist, 19, 361-368.

Vincente, L., Wiley, J. & Carrington, R.A. (1980-81). Duration of stay and other aspects of nursing home use. International Journal of Aging and Human Development, 12, 301-311.

Wershow, H. (1976). The four percent fallacy. The Gerontologist, 16, 52-55.

Zimmer, J.G. (1975). Characteristics of patients and care provided in health-related and skilled nursing facilities. Medical Care, 13, 992-1005.

APPENDIX A

METHODOLOGY SUPPLEMENT

A.1: Age-Sex Adjustment of Long-Term Care Areas

APPENDIX A

AGE-SEX ADJUSTMENT OF POPULATION

1) Population for Long-Term Care Areas was tabulated by age-sex categories.

2) Weighted Sum:

$$\sum \frac{\text{Persons in Age-Sex Group in Facilities X Per Day Cost Facility}}{1{,}000}$$

3) RATE:

$$\frac{\text{Weighted Sum for Age-Sex Group}}{\text{Total Persons in Age-Sex Group}}$$

4) Weight:

$$\frac{\text{Rate in Age/Sex Group}}{\text{Rate for Entire Population}}$$

5) Adjusted Population:

$$\sum (\text{Population in Age-Sex Group X Weight})$$

APPENDIX B

RESULTS SUPPLEMENT

B.1 Alberta Population, 1971 to 1986

B.2 Acute Care Hospital Beds and Utilization, 1971-1986

B.3 Utilization Data Patients Discharged from Acute Care Hospitals, 1971-1986

B.4 Sex Differences in Acute Care Hospital Utilization, 1971-1986

B.5 Utilization of Acute Care Hospitals by Long-Stay Patients, Length of Stay 91 Days and Over

B.6 Utilization of Acute Care Hospitals by Long-Stay Patients, by Age-Sex Category, Length of Stay 91 Days and Over

B.7 Auxiliary and Rehabilitation Beds and Utilization

B.8 Auxiliary and Rehabilitation Hospital Utilization Share by Age-Sex Group

B.9 1986 Census Population By Age, Sex and Long-Term Care Area

B.10 Utilization Rates of Long-Term Care Areas

B.11 Relevance and Commitment Indices

Appendix B.1: Alberta Population, 1971 to 1986

(Thousands)

YEAR	0-64	RPOP	65-74	RPOP	75+	RPOP	Total	RPOP
1971	1,508.9	1.00	72.1	1.00	46.6	1.00	1,627.7	1.00
1972	1,535.4	1.02	76.0	1.05	47.6	1.02	1,659.0	1.02
1973	1,564.1	1.04	75.6	1.05	48.2	1.03	1,687.9	1.04
1974	1,593.6	1.06	79.6	1.10	49.1	1.05	1,722.3	1.06
1975	1,645.4	1.09	82.3	1.14	50.6	1.09	1,778.3	1.09
1976	1,700.1	1.13	85.5	1.19	52.4	1.12	1,838.0	1.13
1977	1,769.8	1.17	88.7	1.23	54.1	1.16	1,912.6	1.18
1978	1,835.4	1.22	91.7	1.27	56.0	1.20	1,983.1	1.22
1979	1,899.8	1.26	94.6	1.31	58.2	1.25	2,052.6	1.26
1980	1,982.7	1.31	97.4	1.35	60.7	1.30	2,140.8	1.32
1981	2,074.3	1.37	100.5	1.39	62.8	1.35	2,237.7	1.37
1982	2,150.6	1.43	103.2	1.43	64.9	1.39	2,318.7	1.42
1983	2,176.2	1.44	105.4	1.46	68.5	1.47	2,350.1	1.44
1984	2,170.4	1.44	107.7	1.49	70.6	1.51	2,348.7	1.44
1985	2,163.9	1.43	111.6	1.55	73.3	1.57	2,348.8	1.44
1986	2,174.5	1.44	116.5	1.62	74.8	1.60	2,365.8	1.45

RPOP=POP/POP 1971

Appendix B.2: Acute Care Hospital Beds and Utilization, 1971-1986

(Thousands)

YEAR	POPULATION	SEPS	SEPRATE	RSEPR	PAT DAYS	DAYRATE	RDAYR	ALOS	RALOS	BEDS	BEDRATE	RBEDS
1971	1,628	378	0.23	1.00	3,239	1.99	1.00	8.58	1.00	11,970	7.35	1.00
1972	1,659	376	0.23	0.98	3,238	1.95	0.98	8.62	1.01	12,437	7.50	1.02
1973	1,688	368	0.22	0.94	3,112	1.84	0.93	8.47	0.99	12,453	7.38	1.00
1974	1,722	373	0.22	0.93	3,090	1.79	0.90	8.28	0.97	12,347	7.17	0.97
1975	1,778	374	0.21	0.91	3,060	1.72	0.86	8.17	0.95	11,447	6.44	0.88
1976	1,837	378	0.21	0.89	3,002	1.63	0.82	7.94	0.93	11,808	6.42	0.87
1977	1,913	383	0.20	0.86	2,952	1.54	0.78	7.72	0.90	12,169	6.36	0.87
1978	1,983	385	0.19	0.84	2,971	1.50	0.75	7.72	0.90	12,010	6.06	0.82
1979	2,053	390	0.19	0.82	2,981	1.45	0.73	7.64	0.89	12,004	5.85	0.80
1980	2,141	384	0.18	0.77	2,906	1.36	0.68	7.57	0.88	12,038	5.62	0.76
1981	2,238	385	0.17	0.74	2,894	1.29	0.65	7.52	0.88	12,079	5.40	0.73
1982	2,319	436	0.19	0.81	3,237	1.40	0.70	7.43	0.87	12,345	5.32	0.72
1983	2,350	436	0.19	0.80	3,189	1.36	0.68	7.32	0.85	12,285	5.23	0.71
1984	2,349	439	0.19	0.81	3,244	1.38	0.69	7.38	0.86	12,238	5.21	0.71
1985	2,349	445	0.19	0.82	3,264	1.39	0.70	7.34	0.86	12,324	5.25	0.71
1986	2,366	444	0.19	0.81	3,206	1.36	0.68	7.22	0.84	12,407	5.24	0.71

POPULATION=POPULATION X 1,000
SEPRATE=SEPS/POPULATION
RSEPR=SEPRATE/1971 SEPRATE
DAYRATE=PAT DAYS/POPULATION
RDAYR=DAYRATE/1971 DAYRATE
RALOS=ALOS/1971 ALOS
BEDRATE=BEDS/POPULATION
RBEDS=BEDRATE/1971 BEDRATE

Appendix B.3: Utilization Data Patients Discharged from Acute Care Hospitals, 1971-1986

PATIENT DAYS

	0-14			15-44			45-64			65-74			75+			Total		
YEAR	DAYS	DAYR	RDAYR	DAYS	DAYR	RDAYR	DAYS	DAYR	RDAYR	DAYS	DAYR	RDAYR	DAYS	DAYR	RDAYR	DAYS	DAYR	RDAYR
1971	698	1.36	0.95	1,017	1.42	1.00	691	2.47	1.74	375	5.20	3.66	458	9.82	6.90	3,239	1.99	1.40
1972	692	1.35	1.03	973	1.32	1.00	698	2.44	1.85	396	5.21	3.95	480	10.09	7.66	3,238	1.95	1.48
1973	615	1.21	0.99	935	1.22	1.00	675	2.31	1.89	389	5.15	4.21	498	10.34	8.45	3,112	1.84	1.51
1974	627	1.25	1.09	912	1.15	1.00	667	2.23	1.94	408	5.12	4.46	476	9.70	8.44	3,090	1.79	1.56
1975	609	1.21	1.14	891	1.07	1.00	643	2.09	1.96	406	4.93	4.62	511	10.10	9.47	3,060	1.72	1.61
1976	589	1.17	1.17	878	1.00	1.00	621	1.95	1.96	399	4.66	4.67	516	9.98	9.99	3,002	1.63	1.64
1977	574	1.13	1.21	875	0.93	1.00	589	1.80	1.93	392	4.42	4.74	522	9.65	10.34	2,952	1.54	1.65
1978	544	1.07	1.17	902	0.91	1.00	600	1.79	1.96	395	4.31	4.73	530	9.46	10.38	2,971	1.50	1.64
1979	549	1.07	1.24	898	0.86	1.00	590	1.72	2.00	401	4.24	4.92	543	9.32	10.83	2,981	1.45	1.69
1980	515	0.98	1.23	883	0.80	1.00	553	1.58	1.98	388	3.98	4.99	567	9.34	11.70	2,906	1.36	1.70
1981	513	0.95	1.27	879	0.75	1.00	532	1.48	1.98	384	3.82	5.10	586	9.32	12.45	2,894	1.29	1.73
1982	553	1.00	1.23	991	0.81	1.00	606	1.64	2.03	443	4.29	5.32	644	9.93	12.30	3,237	1.40	1.73
1983	526	0.95	1.20	982	0.79	1.00	607	1.61	2.04	442	4.20	5.32	632	9.23	11.70	3,189	1.36	1.72
1984	516	0.92	1.17	971	0.79	1.00	615	1.61	2.04	465	4.32	5.47	677	9.60	12.16	3,244	1.38	1.75
1985	497	0.89	1.13	961	0.79	1.00	616	1.60	2.03	467	4.18	5.31	723	9.86	12.52	3,264	1.39	1.76
1986	484	0.86	1.12	945	0.77	1.00	592	1.51	1.96	465	3.99	5.16	719	9.61	12.43	3,206	1.36	1.75

SEPARATIONS

	0-14			15-44			45-64			65-74			75+			Total		
YEAR	SEP	SEPR	RSEPR	SEP	SEPR	RSEPR	SEP	SEPR	RSEPR	SEPR	SEPR	RSEPR	SEP	SEPR	RSEPR	SEP	SEPR	RSEPR
1971	110	0.21	1.00	152	0.21	1.00	65	0.23	1.10	27	0.37	1.73	25	0.53	2.50	378	0.23	1.09
1972	107	0.21	1.03	149	0.20	1.00	66	0.23	1.14	28	0.37	1.83	26	0.54	2.67	376	0.23	1.12
1973	100	0.20	1.02	148	0.19	1.00	66	0.22	1.16	28	0.37	1.91	27	0.55	2.84	368	0.22	1.13
1974	103	0.20	1.09	148	0.19	1.00	67	0.22	1.19	29	0.37	1.95	26	0.54	2.88	373	0.22	1.16
1975	102	0.20	1.14	150	0.18	1.00	65	0.21	1.18	30	0.36	2.01	27	0.54	3.01	374	0.21	1.17
1976	100	0.20	1.14	154	0.17	1.00	65	0.21	1.17	30	0.35	2.03	29	0.55	3.13	378	0.21	1.18
1977	101	0.20	1.18	158	0.17	1.00	65	0.20	1.18	31	0.34	2.04	29	0.54	3.21	383	0.20	1.19
1978	97	0.19	1.17	161	0.16	1.00	65	0.19	1.18	31	0.34	2.07	30	0.54	3.34	385	0.19	1.19
1979	100	0.19	1.24	164	0.16	1.00	63	0.18	1.17	32	0.33	2.12	32	0.54	3.46	390	0.19	1.21
1980	97	0.18	1.25	163	0.15	1.00	60	0.17	1.17	31	0.32	2.14	33	0.54	3.65	384	0.18	1.22
1981	98	0.18	1.28	165	0.14	1.00	58	0.16	1.14	31	0.31	2.19	33	0.52	3.73	385	0.17	1.22
1982	109	0.20	1.29	186	0.15	1.00	67	0.18	1.19	36	0.35	2.29	38	0.58	3.83	436	0.19	1.24
1983	107	0.19	1.29	185	0.15	1.00	68	0.18	1.21	37	0.35	2.35	39	0.57	3.82	436	0.19	1.24
1984	106	0.19	1.27	184	0.15	1.00	70	0.18	1.22	38	0.35	2.35	41	0.58	3.91	439	0.19	1.25
1985	105	0.19	1.24	185	0.15	1.00	71	0.18	1.21	40	0.36	2.39	44	0.60	3.99	445	0.19	1.25
1986	105	0.19	1.24	184	0.15	1.00	70	0.18	1.18	40	0.35	2.30	44	0.59	3.94	444	0.19	1.24

DAYS=DAYS X 1,000
DAYR=DAYS/POP
RDAYR=DAYR/1971 DAYR
SEPS=SEPS X 1,000
SEPR=SEPS/POP
RSEPR=SEPR/1971 SEPR

Appendix B.4: Sex Differences in Acute Care Hospital Utilization, 1971-1986

	MALE						FEMALE								
YEAR	POP	DAYS	DAYR	SEP	SEPR	ALOS	POP	RPOP	DAYS	DAYR	RDAYR	SEP	SEPR	RSEPR	ALOS	RALOS
1971	827.6	1464	1.77	160	0.19	9.14	800.1	0.97	1775	2.22	1.25	217	0.27	1.40	8.16	0.89
1972	842.4	1498	1.78	160	0.19	9.39	816.6	0.97	1740	2.13	1.20	216	0.26	1.40	8.06	0.86
1973	858.3	1438	1.68	156	0.18	9.21	829.6	0.97	1674	2.02	1.20	211	0.25	1.40	7.92	0.86
1974	874.6	1423	1.63	159	0.18	8.93	847.7	0.97	1666	1.97	1.21	214	0.25	1.38	7.79	0.87
1975	902.6	1402	1.55	159	0.18	8.81	875.7	0.97	1658	1.89	1.22	215	0.25	1.39	7.70	0.87
1976	932.4	1379	1.48	161	0.17	8.56	905.0	0.97	1623	1.79	1.21	217	0.24	1.39	7.48	0.87
1977	971.5	1347	1.39	163	0.17	8.29	941.1	0.97	1605	1.71	1.23	220	0.23	1.40	7.29	0.88
1978	1008.8	1363	1.35	163	0.16	8.38	974.3	0.97	1608	1.65	1.22	222	0.23	1.41	7.23	0.86
1979	1045.7	1354	1.30	165	0.16	8.23	1006.9	0.96	1627	1.62	1.25	226	0.22	1.42	7.21	0.88
1980	1092.1	1315	1.20	161	0.15	8.17	1048.7	0.96	1591	1.52	1.26	223	0.21	1.44	7.14	0.87
1981	1143.2	1286	1.12	160	0.14	8.05	1094.5	0.96	1608	1.47	1.31	225	0.21	1.47	7.15	0.89
1982	1184.7	1461	1.23	181	0.15	8.05	1134.0	0.96	1776	1.57	1.27	255	0.22	1.47	6.98	0.87
1983	1199.8	1416	1.18	181	0.15	7.82	1150.3	0.96	1773	1.54	1.31	255	0.22	1.47	6.96	0.89
1984	1191.7	1442	1.21	183	0.15	7.87	1157.0	0.97	1803	1.56	1.29	256	0.22	1.44	7.03	0.89
1985	1188.5	1440	1.21	186	0.16	7.76	1160.3	0.98	1824	1.57	1.30	259	0.22	1.43	7.03	0.91
1986	1192.0	1404	1.18	184	0.15	7.64	1173.8	0.98	1802	1.54	1.30	260	0.22	1.44	6.93	0.91

POP=POPULATION X 1,000
DAYS=PATIENT DAYS X 1,000
DAYR=DAYS/POP
SEP=SEPARATIONS X 1,000
SEPR=SEP/POP
ALOS=DAYS/SEP
RPOP=FEMALE POP/MALE POP
RDAYR=FEMALE DAYR/MALE DAYR
RSEPR=FEMALE SEPR/MALE SEPR
RALOS=FEMALE ALOS/MALE ALOS

Appendix B.5: Utilization of Acute Care Hospitals by Long-Stay Patients Length of Stay 91 Days and Over

	TOTAL		ELDERLY		UTILIZATION DATA							
YEAR	POP	RPOP	POP	REPOP	SEP	SEPR	RSEPR	DAYS	DAYR	RDAYR	ALOS	RALOS
1971	1627.7	1.00	118.7	1.00	1503	0.92	1.00	248	0.15	1.00	165	1.00
1972	1657.4	1.02	122.0	1.03	1887	1.14	1.23	346	0.21	1.37	183	1.11
1973	1689.5	1.04	125.4	1.06	1881	1.11	1.21	334	0.20	1.30	178	1.08
1974	1722.3	1.06	128.7	1.08	1744	1.01	1.10	311	0.18	1.19	178	1.08
1975	1778.3	1.09	132.9	1.12	1938	1.09	1.18	338	0.19	1.25	174	1.06
1976	1838.0	1.13	137.9	1.16	1847	1.00	1.09	319	0.17	1.14	173	1.05
1977	1912.6	1.18	142.8	1.20	1719	0.90	0.97	321	0.17	1.10	187	1.13
1978	1983.1	1.22	147.7	1.24	1737	0.88	0.95	371	0.19	1.23	213	1.30
1979	2052.6	1.26	152.8	1.29	1836	0.89	0.97	333	0.16	1.06	181	1.10
1980	2140.8	1.32	158.1	1.33	1907	0.89	0.96	397	0.19	1.22	208	1.26
1981	2237.7	1.37	163.4	1.38	1939	0.87	0.94	394	0.18	1.16	203	1.23
1982	2318.7	1.42	168.1	1.42	1781	0.77	0.83	346	0.15	0.98	194	1.18
1983	2350.1	1.44	173.9	1.46	1695	0.72	0.78	312	0.13	0.87	184	1.12
1984	2348.7	1.44	178.3	1.50	1958	0.83	0.90	369	0.16	1.03	188	1.14
1985	2348.8	1.44	184.9	1.56	1872	0.80	0.86	362	0.15	1.01	193	1.17
1986	2365.8	1.45	191.3	1.61	2055	0.87	0.97	373	0.16	1.04	181	1.10

POP=POPULATION X 1,000
RPOP=POP/1971 POP
REPOP=65+ POPULATION/1971 65+ POPULATION
SEPR=SEP/POP
RSEPR=SEPR/1971 SEPR
DAYS=PATIENT DAYS X 1,000
DAYR=DAYS/POP
RDAYR=DAYR/1971 DAYR
RALOS=ALOS/1971 ALOS

Appendix B.6: Utilization of Acute Care Hospitals by Long Stay Patients, by Age-Sex Categor
Length of Stay 91 Days and Over

MALE

	0-64				65-74				75+				TOTAL	
YEAR	SEPS	SSEP	DAYS	SDAYS	SEPS	SSEP	DAYS	SDAYS	SEPS	SSEP	DAYS	SDAYS	SEPS	DAYS
1971	338	22.5	52	21.1	148	9.8	23	9.2	254	16.9	46	18.4	740	121
1972	516	27.3	90	26.0	187	9.9	39	11.2	368	19.5	82	23.6	1071	211
1973	464	24.7	75	22.6	203	10.8	35	10.5	357	19.0	87	25.9	1024	197
1974	443	25.4	78	25.2	201	11.5	42	13.4	344	19.7	64	20.6	988	184
1975	441	22.8	73	21.6	200	10.3	36	10.7	411	21.2	77	22.7	1052	186
1976	387	21.0	63	19.9	203	11.0	34	10.5	386	20.9	72	22.5	976	169
1977	367	21.3	61	19.0	180	10.5	35	11.0	339	19.7	71	22.1	886	167
1978	383	22.0	88	23.8	181	10.4	51	13.8	315	18.1	72	19.3	879	211
1979	439	23.9	73	22.0	182	9.9	31	9.2	352	19.2	70	20.9	973	173
1980	420	22.0	77	19.4	181	9.5	39	9.8	371	19.5	100	25.3	972	216
1981	390	20.1	60	15.2	158	8.1	33	8.3	340	17.5	93	23.7	888	186
1982	380	21.3	64	18.5	169	9.5	32	9.2	363	20.4	76	21.9	912	172
1983	373	22.0	60	19.3	153	9.0	26	8.2	293	17.3	54	17.2	819	140
1984	396	20.2	62	16.8	193	9.9	36	9.8	336	17.2	70	19.0	925	168
1985	342	18.3	62	17.1	162	8.7	28	7.7	325	17.4	64	17.7	829	153
1986	367	17.9	62	16.5	197	9.6	30	8.1	371	18.1	74	19.8	935	166

FEMALE

	0-64				65-74				75+				TOTAL	
YEAR	SEPS	SSEP	DAYS	SDAYS	SEPS	SSEP	DAYS	SDAYS	SEPS	SSEP	DAYS	SDAYS	SEPS	DAYS
1971	335	22.3	52	21.0	114	7.6	17	6.7	314	20.9	58	23.5	763	127
1972	399	21.1	64	18.6	113	6.0	20	5.7	304	16.1	52	15.0	816	136
1973	335	17.8	52	15.4	147	7.8	22	6.5	375	19.9	64	19.1	857	137
1974	296	17.0	47	15.0	122	7.0	21	6.7	338	19.4	59	19.0	756	127
1975	313	16.2	50	14.8	147	7.6	23	7.0	426	22.0	78	23.2	886	152
1976	301	16.3	47	14.9	158	8.6	26	8.0	412	22.3	77	24.2	871	150
1977	270	15.7	43	13.5	138	8.0	23	7.3	425	24.7	87	27.2	833	154
1978	262	15.1	44	11.8	146	8.4	26	7.0	450	25.9	90	24.2	858	160
1979	298	16.2	45	13.7	150	8.2	26	7.9	415	22.6	88	26.3	863	159
1980	247	13.0	40	10.1	157	8.2	34	8.5	531	27.8	107	26.9	935	180
1981	326	16.8	50	12.8	178	9.2	30	7.6	547	28.2	127	32.3	1051	208
1982	273	15.3	45	13.0	143	8.0	30	8.5	453	25.4	100	28.9	869	174
1983	250	14.7	44	14.0	153	9.0	28	9.0	473	27.9	101	32.3	876	173
1984	307	15.7	48	13.0	182	9.3	37	10.1	544	27.8	116	31.4	1033	201
1985	301	16.1	47	13.0	172	9.2	31	8.6	570	30.4	130	36.0	1043	208
1986	291	14.2	45	12.0	198	9.6	35	9.5	631	30.7	127	34.0	1120	207

SSEPS=SEPS BY AGE-SEX GROUP/TOTAL SEPS
SDAYS=DAYS BY AGE-SEX GROUP/TOTAL DAYS

Appendix B.7: Auxiliary and Rehabilitation Beds and Utilization

YEAR	ELDERLY POPULATION ACTUAL	ELDERLY POPULATION RELATIVE	PATIENT DAYS ACTUAL	PATIENT DAYS RELATIVE	SEPARATIONS ACTUAL	SEPARATIONS RELATIVE	AUXILIARY AND REHABILIATATION BED ACTUAL	AUXILIARY AND REHABILIATATION BED RELATIVE
1972	122.0	1.00	879	1.00	5600	1.00	3076	1.00
1973	125.4	1.03	1015	1.15	5649	1.01	3331	1.08
1974	128.7	1.05	928	1.05	5557	0.99	3310	1.08
1975	132.9	1.09	1023	1.16	5402	0.96	3329	1.08
1976	137.9	1.13	951	1.08	5275	0.94	3399	1.11
1977	142.8	1.17	992	1.13	5371	0.96	3619	1.18
1978	147.7	1.21	1168	1.33	5870	1.05	3738	1.22
1979	152.8	1.25	1106	1.26	5575	1.00	3856	1.25
1980	158.1	1.30	1142	1.30	5567	0.99	3668	1.19
1981	163.4	1.34	1232	1.40	5527	0.99	3903	1.27
1982	168.1	1.38	1311	1.49	5941	1.06	4213	1.37
1983	173.9	1.43	1314	1.49	6241	1.11	4399	1.43
1984	178.3	1.46	1320	1.50	6172	1.10	4519	1.47
1985	184.9	1.52	1518	1.73	7147	1.28	4740	1.54
1986	191.3	1.57	1549	1.76	7672	1.37	4900	1.59

POP=POPULATION X 1,000
DAYS=PATIENT DAYS X 1,000
REL POP=POP/1972 POP
REL DAYS=DAYS/1972 DAYS
REL SEPS=/SEPS/1972 SEPS
REL BEDS=BEDS/1972 BEDS

Appendix B.8: Auxiliary and Rehabilitation Hospital Utilization Share by Age-Sex Group

MALE

	0-64				65-74				75+				Total	
YEAR	SEPS	SSEP	DAYS	SDAYS	SEPS	SSEP	DAYS	SDAYS	SEPS	SSEP	DAYS	SDAYS	SEPS	DAYS
1972	1458	26.0	126	14.3	412	7.4	67	7.7	734	13.1	179	20.3	2604	372
1973	1491	26.4	119	11.7	458	8.1	76	7.5	759	13.4	222	21.9	2708	417
1974	1464	26.3	120	12.9	469	8.4	79	8.5	737	13.3	168	18.1	2670	366
1975	1519	28.1	150	14.7	400	7.4	87	8.5	752	13.9	226	22.0	2671	463
1976	1564	29.6	105	11.0	387	7.3	76	8.0	794	15.1	196	20.6	2745	377
1977	1475	27.5	143	14.4	423	7.9	68	6.8	770	14.3	203	20.4	2668	413
1978	1615	27.5	140	12.0	487	8.3	77	6.6	891	15.2	230	19.7	2993	447
1979	1423	25.5	139	12.5	488	8.8	79	7.2	913	16.4	240	21.7	2824	458
1980	1534	27.6	144	12.6	480	8.6	74	6.5	981	17.6	283	24.8	2995	501
1981	1501	27.2	129	10.5	446	8.1	94	7.6	941	17.0	260	21.1	2888	483
1982	1762	29.7	157	12.0	453	7.6	101	7.7	973	16.4	270	20.6	3188	529
1983	1790	28.7	145	11.1	468	7.5	95	7.2	958	15.4	286	21.8	3216	526
1984	1902	30.8	137	10.4	450	7.3	101	7.7	899	14.6	288	21.8	3251	526
1985	2017	28.2	163	10.7	526	7.4	101	6.6	1111	15.5	354	23.3	3654	618
1986	1945	25.4	164	10.6	628	8.2	126	8.1	1187	15.5	342	22.1	3760	632

FEMALE

	0-64				65-74				75+				Total	
YEAR	SEPS	SSEP	DAYS	SDAYS	SEPS	SSEP	DAYS	SDAYS	SEPS	SSEP	DAYS	SDAYS	SEPS	DAYS
1972	1518	27.1	115	13.1	468	1.51	85	9.62	1010	57.9	308	35.0	2996	507
1973	1396	24.7	123	12.1	457	1.69	96	9.42	1088	58.9	379	37.3	2941	598
1974	1295	23.3	109	11.7	483	1.76	98	10.55	1109	60.1	354	38.2	2887	561
1975	1218	22.5	118	11.6	458	1.44	78	7.60	1055	58.4	364	35.6	2731	560
1976	1069	20.3	116	12.2	467	1.74	92	9.65	994	55.6	367	38.6	2530	574
1977	1104	20.6	103	10.4	442	1.72	93	9.34	1157	60.0	383	38.6	2703	578
1978	1105	18.8	146	12.5	490	1.75	103	8.78	1282	59.0	472	40.4	2877	721
1979	949	17.0	109	9.8	508	2.13	119	10.75	1294	58.6	420	38.0	2751	647
1980	895	16.1	106	9.2	456	1.61	89	7.83	1221	55.4	446	39.1	2572	641
1981	863	15.6	121	9.8	429	1.69	93	7.58	1347	58.9	535	43.4	2639	749
1982	895	15.1	113	8.6	479	1.78	106	8.07	1379	58.6	563	43.0	2753	782
1983	1194	19.1	128	9.8	504	2.13	133	10.10	1327	58.1	527	40.1	3025	788
1984	1169	18.9	142	10.8	475	1.94	120	9.06	1277	58.7	532	40.3	2921	793
1985	1286	18.0	93	6.1	554	1.82	130	8.57	1653	59.8	678	44.6	3493	901
1986	1376	17.9	137	8.8	685	1.52	117	7.53	1851	60.9	663	42.8	3912	917

SSEP=SEPS/TOTAL SEPS
SDAYS=DAYS/TOTAL DAYS

Appendix B.9: 1986 Census Population By Age, Sex and Long-Term Care Area

Long-Term Care Area	MALE 0-64	MALE 65+	FEMALE 0-64	FEMALE 65+	Percent 65+	SEX RATIOS Total	SEX RATIOS 65+	POPULATIONS CENSUS (A)	POPULATIONS ADJUSTED (B)	RATIO B/A
1 Athabasca	4,825	630	4,430	605	11.77	92	96	10,490	13,367	1.27
2 Barrhead	6,835	730	6,430	730	9.92	95	100	14,725	17,289	1.17
3 Black Diamond	1,970	245	1,895	310	12.56	100	127	4,420	6,124	1.39
4 Bonnyville	12,960	645	11,620	655	5.02	90	102	25,880	20,624	0.80
5 Bow Island	2,130	235	1,930	215	9.98	91	91	4,510	4,974	1.10
6 Brooks	10,095	725	9,335	845	7.48	94	117	21,000	18,983	0.90
7 Calgary	319,130	18,730	310,485	27,170	6.79	100	145	675,515	620,596	0.92
8 Camrose	8,885	1,465	8,720	1,710	15.28	101	117	20,780	31,181	1.50
9 Canmore	5,525	275	5,075	375	5.78	94	136	11,250	9,868	0.88
10 Cardston	6,405	690	6,345	795	10.43	101	115	14,235	16,422	1.15
11 Olds	3,515	490	3,360	540	13.03	97	110	7,905	10,618	1.34
12 Claresholm	2,540	460	2,415	555	17.00	99	121	5,970	9,680	1.62
13 Coronation	3,555	455	3,185	480	12.18	91	105	7,675	9,427	1.23
14 Didsbury	4,260	470	3,960	560	11.14	96	119	9,250	11,316	1.22
15 Drayton Valley	10,420	940	9,245	880	8.47	89	94	21,485	22,037	1.03
16 Drumheller	5,280	700	4,835	840	13.21	95	120	11,655	15,706	1.35
17 Edmonton	291,020	20,595	286,705	29,105	7.92	101	141	627,425	626,346	1.00
18 Edson	15,215	645	13,715	745	4.58	91	116	30,320	23,215	0.77
19 Fairview	4,005	340	3,550	385	8.76	91	113	8,280	9,183	1.11
20 Ft McLeod	2,400	330	2,350	375	12.92	100	114	5,455	7,052	1.29
21 Ft Sask	9,990	505	9,260	615	5.50	94	122	20,370	16,100	0.79
22 Grand Prairie	25,335	1,530	23,905	1,575	5.93	95	103	52,345	44,907	0.86
23 Hanna	2,650	345	2,390	405	12.95	93	117	5,790	7,448	1.29
24 High Prairie	9,275	500	8,610	480	5.19	93	96	18,865	14,841	0.79
25 High River	8,315	800	7,835	1,005	10.05	97	126	17,955	20,298	1.13
26 Hythe	2,975	340	2,870	340	10.42	97	100	6,525	7,361	1.13
27 Innisfail	8,120	945	7,415	1,010	11.18	93	107	17,490	20,886	1.19
28 Islay	915	110	845	90	10.20	91	82	1,960	2,226	1.14
29 Killam	3,560	485	3,285	525	12.86	94	108	7,855	9,822	1.25
30 Lac La Biche	23,460	520	21,570	540	2.30	92	104	46,090	26,914	0.58
31 Lacombe	7,625	870	7,335	1,015	11.19	98	117	16,845	20,636	1.23
32 Lamont	4,070	765	3,760	795	16.61	94	104	9,390	15,123	1.61
33 Leduc	15,520	975	14,650	1,100	6.44	95	113	32,245	28,091	0.87
34 Lethbridge	38,095	4,375	37,820	5,655	11.67	102	129	85,945	107,796	1.25
35 Linden	2,645	365	2,660	470	13.60	104	129	6,140	8,306	1.35
36 Lloydminister	7,260	650	6,795	785	9.27	96	121	15,480	16,949	1.09
37 Mclennan	2,755	285	2,505	280	9.70	92	98	5,825	6,563	1.13
38 Mayerthorpe	7,250	415	6,555	405	5.61	91	98	14,625	11,790	0.81
39 Medicine Hat	22,825	2,750	22,535	3,440	12.01	102	125	51,550	62,992	1.22
40 Mun Crowsnest	3,070	450	2,895	515	13.92	97	114	6,930	9,506	1.37
41 Oyen	1,905	235	1,760	235	11.37	93	100	4,135	5,082	1.23
42 Peace River	17,910	1,130	16,475	1,145	6.21	93	101	36,660	31,727	0.87
43 Pincher Creek	3,385	395	3,125	425	11.19	94	108	7,330	8,841	1.21

Sex Ratios: Number of Females per 100 Males

Appendix B.9: 1986 Census Population By Age, Sex and Long-Term Care Area (Continued)

Long-Term Care Area	MALE 0-64	MALE 65+	FEMALE 0-64	FEMALE 65+	Percent 65+	SEX RATIOS Total	SEX RATIOS 65+	POPULATIONS CENSUS (A)	POPULATIONS ADJUSTED (B)	RATIO B/A
44 Ponoka	5,820	820	5,610	945	13.38	99	115	13,195	17,582	1.33
45 Provost	1,605	280	1,540	280	15.11	97	100	3,705	5,415	1.46
46 Radway	2,765	415	2,460	375	13.13	89	90	6,015	7,868	1.31
47 Red Deer	33,540	2,475	33,160	3,100	7.71	101	125	72,275	69,551	0.96
48 Rimbey	2,370	365	2,170	390	14.26	94	107	5,295	7,541	1.42
49 Rocky Mtn Hse	6,170	465	5,845	445	7.04	95	96	12,925	11,551	0.89
50 St Albert	26,540	910	25,215	1,135	3.80	96	125	53,800	37,839	0.70
51 St Paul	6,860	750	6,385	780	10.36	94	104	14,775	16,091	1.09
52 Smoky Lake	2,855	480	2,745	445	14.18	96	93	6,525	9,281	1.42
53 Stettler	4,865	705	4,715	825	13.77	99	117	11,110	14,768	1.33
54 Stony Plain	21,445	1,165	20,090	1,205	5.40	94	103	43,905	33,870	0.77
55 Strathmore	4,345	395	4,070	390	8.53	94	99	9,200	8,567	0.93
56 Taber	5,845	575	5,475	675	9.94	96	117	12,570	14,244	1.13
57 Trochu	1,260	220	1,195	260	16.35	98	118	2,935	4,416	1.50
58 Two Hills	1,585	405	1,380	385	21.04	89	95	3,755	6,997	1.86
59 Vegreville	4,585	855	4,420	1,000	17.08	100	117	10,860	18,284	1.68
60 Vermilion	2,845	405	2,670	495	14.03	97	122	6,415	9,084	1.42
61 Viking	1,460	270	1,345	265	16.02	93	98	3,340	5,227	1.57
62 Vulcan	2,335	360	2,210	395	14.25	97	110	5,300	7,132	1.35
63 Wainwright	4,350	515	3,900	615	12.05	93	119	9,380	11,853	1.26
64 Westlock	5,620	860	5,235	870	13.75	94	101	12,585	17,553	1.39
65 Wetaskiwin	8,965	990	8,490	1,190	11.10	97	120	19,635	23,142	1.18
SUM	1,103,075	83,585	1,062,335	106,585	8.09	98	127	2,366,070	2,366,070	1.00

Sex Ratios: Number of Females per 100 Males

Appendix B.10: Utilization Rates of Long-Term Care Areas

LTCA	Patients in Facilities From LTCA			Patients in Facilities In LTCA			Long-Term Care Beds			Occupancy Rate			Beds Per Capita			Utilization Rate		
	Aux H	N H	Total	Aux H	N H	Total	SPOP	Aux H	N H	Total	Aux H	N H	Total	Aux H	N H	Total	Aux H	N H	Total
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(E/I)	(F/J)	(G/K)	(I/M)	(J/M)	(K/M)	(B/M)	(C/M)	(D/M)
1	29	55	84	22	50	72	13367	23	50	73	0.96	1.00	0.99	1.72	3.74	5.46	2.17	4.11	6.28
2	30	80	110	25	75	100	17289	25	75	100	1.00	1.00	1.00	1.45	4.34	5.78	1.74	4.63	6.36
3	20	6	26	23	0	23	6124	23	0	23	1.00	0.00	1.00	3.76	0.00	3.76	3.27	0.98	4.25
4	27	52	79	24	49	73	20624	30	50	80	0.80	0.98	0.91	1.45	2.42	3.88	1.31	2.52	3.83
5	18	2	20	19	0	19	4974	20	0	20	0.95	0.00	0.95	4.02	0.00	4.02	3.62	0.40	4.02
6	27	55	82	25	50	75	18983	25	50	75	1.00	1.00	1.00	1.32	2.63	3.95	1.42	2.90	4.32
7	1340	2037	3377	1386	2210	3596	620596	1444	2282	3726	0.96	0.97	0.97	2.33	3.68	6.00	2.16	3.28	5.44
8	54	105	159	50	96	146	31181	50	100	150	1.00	0.96	0.97	1.60	3.21	4.81	1.73	3.37	5.10
9	19	9	28	21	0	21	9868	23	0	23	0.91	0.00	0.91	2.33	0.00	2.33	1.93	0.91	2.84
10	29	42	71	32	38	70	16422	34	40	74	0.94	0.95	0.95	2.07	2.44	4.51	1.77	2.56	4.32
11	31	26	57	25	0	25	10618	25	0	25	1.00	0.00	1.00	2.35	0.00	2.35	2.92	2.45	5.37
12	38	21	59	47	0	47	9680	50	0	50	0.94	0.00	0.94	5.17	0.00	5.17	3.93	2.17	6.10
13	29	42	71	23	33	56	9427	23	33	56	1.00	1.00	1.00	2.44	3.50	5.94	3.08	4.46	7.53
14	32	39	71	48	49	97	11316	50	40	90	0.96	1.23	1.08	4.42	3.53	7.95	2.83	3.45	6.27
15	30	79	109	25	20	45	22037	30	20	50	0.83	1.00	0.90	1.36	0.91	2.27	1.36	3.58	4.95
16	31	78	109	31	79	110	15706	30	80	110	1.03	0.99	1.00	1.91	5.09	7.00	1.97	4.97	6.94
17	1508	1990	3498	1632	1963	3595	626346	1992	2011	4003	0.82	0.98	0.90	3.18	3.21	6.39	2.41	3.18	5.58
18	13	57	70	0	49	49	23215	0	50	50	0.00	0.98	0.98	0.00	2.15	2.15	0.56	2.46	3.02
19	30	41	71	34	40	74	9183	35	40	75	0.97	1.00	0.99	3.81	4.36	8.17	3.27	4.46	7.73
20	3	32	35	0	45	45	7052	0	50	50	0.00	0.90	0.90	0.00	7.09	7.09	0.43	4.54	4.96
21	20	52	72	0	66	66	16100	0	70	70	0.00	0.94	0.94	0.00	4.35	4.35	1.24	3.23	4.47
22	85	119	204	90	114	204	44907	96	138	234	0.94	0.83	0.87	2.14	3.07	5.21	1.89	2.65	4.54
23	2	49	51	0	49	49	7448	0	50	50	0.00	0.98	0.98	0.00	6.71	6.71	0.27	6.58	6.85
24	10	48	58	0	50	50	14841	0	52	52	0.00	0.96	0.96	0.00	3.50	3.50	0.67	3.23	3.91
25	49	65	114	49	50	99	20298	25	50	75	1.96	1.00	1.32	1.23	2.46	3.70	2.41	3.20	5.62
26	4	20	24	0	18	18	7361	0	25	25	0.00	0.72	0.72	0.00	3.40	3.40	0.54	2.72	3.26
27	53	29	82	40	0	40	20886	40	0	40	1.00	0.00	1.00	1.92	0.00	1.92	2.54	1.39	3.93
28	9	1	10	16	0	16	2226	20	0	20	0.80	0.00	0.80	8.99	0.00	8.99	4.04	0.45	4.49
29	50	37	87	50	0	50	9822	50	0	50	1.00	0.00	1.00	5.09	0.00	5.09	5.09	3.77	8.86
30	25	9	34	25	0	25	26914	25	0	25	1.00	0.00	1.00	0.93	0.00	0.93	0.93	0.33	1.26
31	30	49	79	25	49	74	20636	25	50	75	1.00	0.98	0.99	1.21	2.42	3.63	1.45	2.37	3.83
32	70	48	118	95	31	126	15123	94	31	125	1.01	1.00	1.01	6.22	2.05	8.27	4.63	3.17	7.80
33	12	121	133	0	178	178	28091	0	179	179	0.00	0.99	0.99	0.00	6.37	6.37	0.43	4.31	4.73
34	110	353	463	99	357	456	107796	100	370	470	0.99	0.96	0.97	0.93	3.43	4.36	1.02	3.27	4.30
35	20	34	54	22	34	56	8306	23	37	60	0.96	0.92	0.93	2.77	4.45	7.22	2.41	4.09	6.50
36	43	67	110	39	63	102	16949	50	75	125	0.78	0.84	0.82	2.95	4.42	7.37	2.54	3.95	6.49
37	4	45	49	0	50	50	6563	0	50	50	0.00	1.00	1.00	0.00	7.62	7.62	0.61	6.86	7.47
38	5	41	46	0	46	46	11790	0	50	50	0.00	0.92	0.92	0.00	4.24	4.24	0.42	3.48	3.90
39	138	241	379	132	230	362	62992	136	230	366	0.97	1.00	0.99	2.16	3.65	5.81	2.19	3.83	6.02
40	1	60	61	0	64	64	9506	0	66	66	0.00	0.97	0.97	0.00	6.94	6.94	0.11	6.31	6.42
41	27	7	34	29	0	29	5082	30	0	30	0.97	0.00	0.97	5.90	0.00	5.90	5.31	1.38	6.69
42	51	72	123	50	76	126	31727	50	76	126	1.00	1.00	1.00	1.58	2.40	3.97	1.61	2.27	3.88
43	18	8	26	19	0	19	8841	20	0	20	0.95	0.00	0.95	2.26	0.00	2.26	2.04	0.90	2.94
44	9	97	106	0	70	70	17582	0	70	70	0.00	1.00	1.00	0.00	3.98	3.98	0.51	5.52	6.03
45	3	43	46	0	49	49	5415	0	50	50	0.00	0.98	0.98	0.00	9.23	9.23	0.55	7.94	8.49

Appendix B.10: Utilization Rates of Long-Term Care Areas (cont'd)

LTCA	Patients in Facilities From LTCA			Patients in Facilities In LTCA			Long-Term Care											
								Beds			Occupancy Rate			Beds Per Capita			Utilization Rate	
	Aux H	N H	Total	Aux H	N H	Total	SPOP	Aux H	N H	Total	Aux H	N H	Total	Aux H	N H	Total	Aux H	N H	Total
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(E/I)	(F/J)	(G/K)	(I/M)	(J/M)	(K/M)	(B/M)	(C/M)	(D/M)
46	27	13	40	20	0	20	7868	20	0	20	1.00	0.00	1.00	2.54	0.00	2.54	3.43	1.65	5.08
47	107	284	391	100	279	379	69551	100	288	388	1.00	0.97	0.98	1.44	4.14	5.58	1.54	4.08	5.62
48	33	1	34	42	0	42	7541	45	0	45	0.93	0.00	0.93	5.97	0.00	5.97	4.38	0.13	4.51
49	33	10	43	29	0	29	11551	20	0	20	1.45	0.00	1.45	1.73	0.00	1.73	2.86	0.87	3.72
50	42	76	118	0	159	159	37839	0	162	162	0.00	0.98	0.98	0.00	4.28	4.28	1.11	2.01	3.12
51	3	58	61	0	72	72	16091	0	75	75	0.00	0.96	0.96	0.00	4.66	4.66	0.19	3.60	3.79
52	30	32	62	23	33	56	9281	23	33	56	1.00	1.00	1.00	2.48	3.56	6.03	3.23	3.45	6.68
53	46	49	95	50	49	99	14768	50	50	100	1.00	0.98	0.99	3.39	3.39	6.77	3.11	3.32	6.43
54	25	97	122	0	89	89	33870	0	90	90	0.00	0.99	0.99	0.00	2.66	2.66	0.74	2.86	3.60
55	3	7	10	0	23	23	8567	0	23	23	0.00	1.00	1.00	0.00	2.68	2.68	0.35	0.82	1.17
56	20	58	78	20	46	66	14244	20	50	70	1.00	0.92	0.94	1.40	3.51	4.91	1.40	4.07	5.48
57	2	16	18	0	24	24	4416	0	25	25	0.00	0.96	0.96	0.00	5.66	5.66	0.45	3.62	4.08
58	14	41	55	15	39	54	6997	15	30	45	1.00	1.30	1.20	2.14	4.29	6.43	2.00	5.86	7.86
59	45	48	93	50	40	90	18284	50	40	90	1.00	1.00	1.00	2.73	2.19	4.92	2.46	2.63	5.09
60	3	47	50	0	48	48	9084	0	50	50	0.00	0.96	0.96	0.00	5.50	5.50	0.33	5.17	5.50
61	12	31	43	0	62	62	5227	0	64	64	0.00	0.97	0.97	0.00	12.24	12.24	2.30	5.93	8.23
62	18	40	58	12	34	46	7132	16	36	52	0.75	0.94	0.88	2.24	5.05	7.29	2.52	5.61	8.13
63	61	10	71	74	0	74	11853	75	0	75	0.99	0.00	0.99	6.33	0.00	6.33	5.15	0.84	5.99
64	39	51	90	48	51	99	17553	50	52	102	0.96	0.98	0.97	2.85	2.96	5.81	2.22	2.91	5.13
65	53	55	108	47	49	96	23142	50	50	100	0.94	0.98	0.96	2.16	2.16	4.32	2.29	2.38	4.67
	4802	7587	12389	4802	7587	12389	2366070	5250	7808	13058	0.91	0.97	0.95	2.22	3.30	5.52	2.03	3.21	5.24

Appendix B.11: Relevance and Commitment Indices

LTCA (A)	Patients From LTCA Aux H (B)	Patients From LTCA N H (C)	Patients In LTCA Aux H (D)	Patients In LTCA N H (E)	Patients From LTCA In LTCA Aux H (F)	Patients From LTCA In LTCA N H (G)	Auxiliary Hospital R.I. (F/B)	Auxiliary Hospital C.I. (F/D)	Nursing Home R.I. (G/C)	Nursing Home C.I. (G/E)
1	29	55	22	50	21	43	0.72	0.95	0.78	0.86
2	30	80	25	75	25	65	0.83	1.00	0.81	0.87
3	20	6	23	0	19	0	0.95	0.83	0.00	0.00
4	27	52	24	49	24	41	0.89	1.00	0.79	0.84
5	18	2	19	0	17	0	0.94	0.89	0.00	0.00
6	27	55	25	50	23	44	0.85	0.92	0.80	0.88
7	1340	2037	1386	2210	1324	1994	0.99	0.96	0.98	0.90
8	54	105	50	96	46	79	0.85	0.92	0.75	0.82
9	19	9	21	0	17	0	0.89	0.81	0.00	0.00
10	29	42	32	38	28	34	0.97	0.88	0.81	0.89
11	31	26	25	0	16	0	0.52	0.64	0.00	0.00
12	38	21	47	0	36	0	0.95	0.77	0.00	0.00
13	29	42	23	33	23	32	0.79	1.00	0.76	0.97
14	32	39	48	49	28	31	0.88	0.58	0.79	0.63
15	30	79	25	20	16	15	0.53	0.64	0.19	0.75
16	31	78	31	79	30	69	0.97	0.97	0.88	0.87
17	1508	1990	1632	1963	1458	1714	0.97	0.89	0.86	0.87
18	13	57	0	49	0	37	0.00	0.00	0.65	0.76
19	30	41	34	40	26	37	0.87	0.76	0.90	0.93
20	3	32	0	45	0	25	0.00	0.00	0.78	0.56
21	20	52	0	66	0	38	0.00	0.00	0.73	0.58
22	85	119	90	114	83	97	0.98	0.92	0.82	0.85
23	2	49	0	49	0	40	0.00	0.00	0.82	0.82
24	10	48	0	50	0	39	0.00	0.00	0.81	0.78
25	49	65	49	50	43	44	0.88	0.88	0.68	0.88
26	4	20	0	18	0	15	0.00	0.00	0.75	0.83
27	53	29	40	0	37	0	0.70	0.93	0.00	0.00
28	9	1	16	0	9	0	1.00	0.56	0.00	0.00
29	50	37	50	0	39	0	0.78	0.78	0.00	0.00
30	25	9	25	0	20	0	0.80	0.80	0.00	0.00
31	30	49	25	49	23	42	0.77	0.92	0.86	0.86
32	70	48	95	31	57	25	0.81	0.60	0.52	0.81
33	12	121	0	178	0	100	0.00	0.00	0.83	0.56
34	110	353	99	357	95	325	0.86	0.96	0.92	0.91
35	20	34	22	34	19	23	0.95	0.86	0.68	0.68
36	43	67	39	63	38	59	0.88	0.97	0.88	0.94
37	4	45	0	50	0	39	0.00	0.00	0.87	0.78
38	5	41	0	46	0	33	0.00	0.00	0.80	0.72
39	138	241	132	230	131	223	0.95	0.99	0.93	0.97
40	1	60	0	64	0	56	0.00	0.00	0.93	0.88
41	27	7	29	0	26	0	0.96	0.90	0.00	0.00
42	51	72	50	76	43	65	0.84	0.86	0.90	0.86
43	18	8	19	0	18	0	1.00	0.95	0.00	0.00

Appendix B.11: Relevance and Commitment Indices (cont'd)

LTCA (A)	Patients From LTCA Aux H (B)	Patients From LTCA N H (C)	Patients In LTCA Aux H (D)	Patients In LTCA N H (E)	Patients From LTCA In LTCA Aux H (F)	Patients From LTCA In LTCA N H (G)	Auxiliary Hospital R.I. (F/B)	Auxiliary Hospital C.I. (F/D)	Nursing Home R.I. (G/C)	Nursing Home C.I. (G/E)
44	9	97	0	70	0	55	0.00	0.00	0.57	0.79
45	3	43	0	49	0	41	0.00	0.00	0.95	0.84
46	27	13	20	0	13	0	0.48	0.65	0.00	0.00
47	107	284	100	279	86	232	0.80	0.86	0.82	0.83
48	33	1	42	0	32	0	0.97	0.76	0.00	0.00
49	33	10	29	0	28	0	0.85	0.97	0.00	0.00
50	42	76	0	159	0	51	0.00	0.00	0.67	0.32
51	3	58	0	72	0	48	0.00	0.00	0.83	0.67
52	30	32	23	33	18	22	0.60	0.78	0.69	0.67
53	46	49	50	49	43	41	0.93	0.86	0.84	0.84
54	25	97	0	89	0	51	0.00	0.00	0.53	0.57
55	3	7	0	23	0	0	0.00	0.00	0.00	0.00
56	20	58	20	46	18	36	0.90	0.90	0.62	0.78
57	2	16	0	24	0	12	0.00	0.00	0.75	0.50
58	14	41	15	39	10	29	0.71	0.67	0.71	0.74
59	45	48	50	40	42	30	0.93	0.84	0.63	0.75
60	3	47	0	48	0	45	0.00	0.00	0.96	0.94
61	12	31	0	62	0	28	0.00	0.00	0.90	0.45
62	18	40	12	34	8	26	0.44	0.67	0.65	0.76
63	61	10	74	0	61	0	1.00	0.82	0.00	0.00
64	39	51	48	51	37	43	0.95	0.77	0.84	0.84
65	53	55	47	49	45	43	0.85	0.96	0.78	0.88
SUM	4802	7587	4802	7587	4299	6356	0.90	0.90	0.84	0.84